U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-260 299

REPORT ON WATER POLLUTION, SOUTHEAST DRAINAGE BASINS. APPENDIX. PART II

Public Health Service
Washington, D. C.

1950

PB 260 299

REPORT ON WATER POLLUTION SOUTHEAST DRAINAGE BASINS

1950

FEDERAL SECURITY AGENCY
PUBLIC HEALTH SERVICE
WATER POLLUTION CONTROL DIVISION

IN FOUR PARTS - PART 2

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See also Part 3, PB-260 300. Errata sheet inserted.

16. Abstracts

The current status of the National Water Pollution Control Program for the Southeast Drainage Basins is reported. The study provides an overview of water pollution control for the area, giving available data on water use, condition of the waters, adequacy of existing treatment facilities, and the need for improved, enlarged, or new treatment works. The area includes part or all of Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Tennessee, and West Virginia.

17. Key Words and Document Analysis. 17a. Descriptors

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ERRATA

Part 2

Page	
5	Figure 20,925 should read 20,920
7	Figure ** 2 should read **3, and in the footnote marked (**) the words "- - - - - -additional, with no treatment - - - - - - -. "should be deleted.
11	Figure *2 should read *3.
13	Add "Plans under preparation" under Remarks for Fredericksburg.
23	Figure 6 under Number (Mun) should read **6, and the footnote added" ** One municipality requires two new plants."
38	Column heading Number (Mun) should be footnoted "a. Number includes four municipalities in multiple requirement classification."
95	Footnote marked (**) reading "- - - - datum is not given." should read "- - - - data are not given."
99	Column heading Number (Mun) should be footnoted "a. Number includes one municipality in two requirement classifications." and footnote marked (*) reading "- - - - - - datum is available." should read" - - - data are available."
101	Add "Abatement ordered." under Remarks for Durham and Raleigh (1) and (2).
108	Total of column Sources of Pollution should read "15"
113	Column headed Number (Mun) should be footnoted "a. Number includes two municipalities in multiple requirement classification."
124	Figure 14 under column Municipalities should read "**14" and a footnote added "** Three municipalities also included in primary treatment for a portion of their sewage."

Page	
128	Column headed Number (Mun) should be footnoted" a. Number includes nine municipalities in two requirement classifications."
129	Figure 16 under column Municipal should read "*16" and a footnote added" *Includes three municipalities requiring multiple treatment works."
139	Figure 12 under column Municipalities should read "**12" and a footnote added" ** One municipality also included in primary treatment."
143	Column headed Number should be footnoted "a. Number includes six municipalities in two requirement classifications. Figure 21 under column Number(Mun.) should read "*21" a footnote added "*Includes one municipality requiring two new plants."
167	Change Operation, Industrial to one Undetermined.

REPORT ON WATER POLLUTION

Southeast Drainage Basins

1950

PRELIMINARY DRAFT OF PROPOSED REPORT

APPENDIX

Part 2

NOT FOR PUBLIC RELEASE

Prepared by:

Southeast Drainage Basins Office
Division of Water Pollution Control
Public Health Service, Federal Security Agency

on the basis of information supplied
by the following Agencies:

Alabama Water Improvement Advisory Commission
Florida State Board of Health
Georgia Department of Public Health
Louisiana Stream Control Commission
Mississippi State Board of Health
North Carolina State Board of Health
South Carolina Water Pollution Control Authority
Tennessee Stream Pollution Control Board
Virginia Water Control Board

TABLE OF CONTENTS

Part 1 - Southeast Drainage Basins Report

Authority for Report

Acknowledgments

Summary

Conclusions

Recommendations

General Description

    Historical Background

    Physical Description

    Economic Development

Uses of Water Resources

Pollution Contributed to Water Resources

Damages to Water Resources

Benefits Resulting from Pollution Prevention & Abatement

Pollution Prevention Measures in Effect

Pollution Prevention Measure Required

Maps

Sources of Pollution

Existing Treatment Works

Project Requirements

Existing Primary Water Uses

Tables

Table A - Sources of Pollution - Municipal

Table B - Sources of Pollution - Industrial

Table C - Existing Treatment Facilities - Municipal

Table D - Existing Treatment Facilities - Industrial

Table E - Adequacy of Existing Treatment Facilities

Table F - Progress in Pollution Abatement

Table G - Requirements for Municipal & Industrial Waste Treatment Plants

Table H - Status of Treatment Works Projects to Abate Pollution

APPENDIX

Part 2 - Sub-basin Reports

Part 2 - Page No.

Rappahannock River Sub-basin

Description - - - - - - - - - - - - - - - - - - 1

Tables A_1 thru I_1 - - - - - - - - - - - - - - - 5

York River Sub-basin

Description - - - - - - - - - - - - - - - - - - 14

Tables A_2 thru I_2 - - - - - - - - - - - - - - - 17

James River Sub-basin

Description - - - - - - - - - - - - - - - - - - 26

Tables A_3 thru I_3 - - - - - - - - - - - - - - - 32

Part 2 - Page No.

Chowan River Sub-basin

Description - - - - - - - - - - - - - - - - - - 45

Tables A_4 thru I_4 - - - - - - - - - - - - - - 50

Roanoke River Sub-basin

Description - - - - - - - - - - - - - - - - - - 60

Tables A_5 thru I_5 - - - - - - - - - - - - - - 65

Tar River Sub-basin - - - - -

Description - - - - - - - - - - - - - - - - - - 76

Tables A_6 thru I_6 - - - - - - - - - - - - - - 80

Neuse River Sub-basin

Description - - - - - - - - - - - - - - - - - - 89

Tables A_7 thru I_7 - - - - - - - - - - - - - - 93

North Carolina-Virginia Coast Sub-basin

Description - - - - - - - - - - - - - - - - - - 102

Tables A_8 thru I_8 - - - - - - - - - - - - - - 107

Cape Fear River Sub-basin

Description - - - - - - - - - - - - - - - - - - 117

Tables A_9 thru I_9 - - - - - - - - - - - - - - 122

Yadkin-Pee Dee River Sub-basin

Description - - - - - - - - - - - - - - - - - - 132

Tables A_{10} thru I_{10} - - - - - - - - - - - - - 137

Pee Dee River Sub-basin

Description - - - - - - - - - - - - - - - - - - 147

Tables A_{11} thru I_{11} - - - - - - - - - - - - 151

Part 2 - Page No.

Catawba-Wateree River Sub-basin

Description - - - - - - - - - - - - - - - - - - 161

Tables A_{12} thru I_{12} - - - - - - - - - - - - - - 167

Congaree River Sub-basin

Description - - - - - - - - - - - - - - - - - - 177

Tables A_{13} thru I_{13}. - - - - - - - - - - - - - - 183

Santee-Cooper River Sub-basin

Description - - - - - - - - - - - - - - - - - - 194

Tables A_{14} thru I_{14} - - - - - - - - - - - - - - 198

Edisto-Combahee River Sub-basin

Description - - - - - - - - - - - - - - - - - - 207

Tables A_{15} thru I_{15} - - - - - - - - - - - - - - 211

Savannah River Sub-basin

Description - - - - - - - - - - - - - - - - - - 220

Tables A_{16} thru I_{16} - - - - - - - - - - - - - - 227

Part 3 - Sub-basins Reports

Part 3 - Page No.

Ogeechee River Sub-basin

Description - - - - - - - - - - - - - - - - - - 237

Tables A_{17} thru I_{17} - - - - - - - - - - - - - - 241

Oconee River Sub-basin

Description - - - - - - - - - - - - - - - - - - 250

Tables A_{18} thru I_{18} - - - - - - - - - - - - - - 254

Part 3 - Page No.

Ochmulgee River Sub-basin

Description - - - - - - - - - - - - - - - - - 263

Tables A_{19} thru I_{19} - - - - - - - - - - - - - 267

Altamaha River Sub-basin

Description - - - - - - - - - - - - - - - - - 276

Tables A_{20} thru I_{20} - - - - - - - - - - - - - 281

Satilla River Sub-basin

Description - - - - - - - - - - - - - - - - - 290

Tables A_{21} thru I_{21} - - - - - - - - - - - - - 295

St. Marys - Nassau River Sub-basin

Description - - - - - - - - - - - - - - - - - 304

Tables A_{22} thru I_{22} - - - - - - - - - - - - - 308

St. Johns River Sub-basin

Description - - - - - - - - - - - - - - - - - 317

Tables A_{23} thru I_{23} - - - - - - - - - - - - - 321

Suwanee River Sub-basin

Description - - - - - - - - - - - - - - - - - 330

Tables A_{24} thru I_{24} - - - - - - - - - - - - - 335

Ochlockonee - St.Marks River Sub-basin

Description - - - - - - - - - - - - - - - - - 344

Tables A_{25} thru I_{25} - - - - - - - - - - - - - 349

Withlacoochee River Sub-basin

Description - - - - - - - - - - - - - - - - - 358

Tables A_{26} thru I_{26} - - - - - - - - - - - - - 361

Part 3 - Page No.

Tampa Bay Area Sub-basin

Description - - - - - - - - - - - - - - - - - - 370

Tables A_{27} thru I_{27} - - - - - - - - - - - - - 376

Peace River Sub-basin

Description - - - - - - - - - - - - - - - - - - 386

Tables A_{28} thru I_{28} - - - - - - - - - - - - - 390

Kissimmee River Sub-basin

Description - - - - - - - - - - - - - - - - - - 399

Tables A_{29} thru I_{29} - - - - - - - - - - - - - 403

Florida East Coastal Area Sub-basin

Description - - - - - - - - - - - - - - - - - - 412

Tables A_{30} thru I_{30} - - - - - - - - - - - - - 419

Lower Florida Area Sub-basin

Description - - - - - - - - - - - - - - - - - - 428

Tables A_{31} thru I_{31} - - - - - - - - - - - - - 434

Part 4 - Sub-basins Reports

Part 4 - Page No.

Flint River Sub-basin

Description - - - - - - - - - - - - - - - - - - 443

Tables A_{32} thru I_{32} - - - - - - - - - - - - - 447

Chattahoochee River Sub-basin

Description - - - - - - - - - - - - - - - - - - 456

Tables A_{33} thru I_{33} - - - - - - - - - - - - - 463

Part 4 - Page No.

Apalachicola River Sub-basin

Description - - - - - - - - - - - - - - - - - - 472

Tables A_{34} thru I_{34} - - - - - - - - - - - - - 475

Choctawhatchee River Sub-basin

Description - - - - - - - - - - - - - - - - - - 484

Tables A_{35} thru I_{35} - - - - - - - - - - - - - 489

Perdido-Escambia River Sub-basin

Description - - - - - - - - - - - - - - - - - - 499

Tables A_{36} thru I_{36} - - - - - - - - - - - - - 504

Tallapoosa River Sub-basin

Description - - - - - - - - - - - - - - - - - - 514

Tables A_{37} thru I_{37} - - - - - - - - - - - - - 519

Coosa River Sub-basin

Description - - - - - - - - - - - - - - - - - - 529

Tables A_{38} thru I_{38} - - - - - - - - - - - - - 534

Cahaba River Sub-basin

Description - - - - - - - - - - - - - - - - - - 544

Tables A_{39} thru I_{39} - - - - - - - - - - - - - 548

Alabama River Sub-basin

Description - - - - - - - - - - - - - - - - - - 557

Tables A_{40} thru I_{40} - - - - - - - - - - - - - 563

Upper Tombigbee River Sub-basin

Description - - - - - - - - - - - - - - - - - - 572

Tables A_{41} thru I_{41} - - - - - - - - - - - - - 577

Part 4 - Page No.

Warrior River Sub-basin

Description - - - - - - - - - - - - - - - - - 587

Tables A_{42} thru I_{42} - - - - - - - - - - - - - 594

Lower Tombigbee River Sub-basin

Description - - - - - - - - - - - - - - - - - 604

Tables A_{43} thru I_{43} - - - - - - - - - - - - - 609

Mobile Bay Area Sub-basin

Description - - - - - - - - - - - - - - - - - - 618

Tables A_{44} thru I_{44} - - - - - - - - - - - - - 623

Pascagoula River Sub-basin

Description - - - - - - - - - - - - - - - - - 632

Tables A_{45} thru I_{45} - - - - - - - - - - - - - 638

Pearl River Sub-basin

Description - - - - - - - - - - - - - - - - - 648

Tables A_{46} thru I_{46} - - - - - - - - - - - - - - 652

Each sub-basin report includes the following:

Table A	Sources of Pollution - Municipal
Table B	Sources of Pollution - Industrial
Table C	Existing Treatment Facilities - Municipal
Table D	Existing Treatment Facilities - Industrial
Table E	Adequacy of Existing Treatment Facilities
Table F	Progress in Pollution Abatement
Table G	Requirements for Municipal and Industrial Waste Treatment Plants
Table H	Status of Treatment Works Projects to Abate Pollution
Table I	Project List - Municipalities and Industries Requiring Improvements for Abatement of Pollution

SUB-BASIN 1

RAPPAHANNOCK RIVER BASIN

GENERAL DESCRIPTION

The Rappahannock River Basin is bounded on the north and west by the Potomac River Basin, on the east by Chesapeake Bay, and on the south by the York and James River Basins.

The total drainage area of the Rappahannock River Basin is about 2,948 square miles and lies entirely within the State of Virginia.

The headwaters of the Rappahannock, and that of its principal tributary, the Rapidan, lie on the eastern slopes of the Blue Ridge Mountains. The river flows in a general easterly direction across the Piedmont Plateau and the Coastal Plain to Chesapeake Bay.

The climate of the basin is classed as humid with average annual rainfall varying from forty-one inches to forty-six inches. Except for summer storms, the rainfall is rather evenly distributed throughout the year. The mean temperature varies from fifty-five to fifty-eight degrees and the growing season averages about 250 days.

The total population of the basin, according to the preliminary census of 1950 was about 110,740, which was thirteen percent urban.

ECONOMIC DEVELOPMENT

The basin contains two urban communities which comprise thirteen percent of the population. The largest of these is Fredericksburg which has a population of 12,143.

Farming is the chief economic activity of the basin with livestock and poultry raising, dairying and truck crop farming being the principal types. Industries are relatively few and scattered. These include a large organic chemical industry at Fredericksburg and a number of canneries and other food processing plants. Oystering and fishing are the major source of livelihood for the majority of the people in the coastal counties.

USE OF WATER RESOURCES

There are fifteen public water supplies in the basin serving a population of 21,078. Three of these serving 17,250 people are surface supplies.

Valuable commercial fisheries exist in the tidal estuary and along adjacent shores in Chesapeake Bay.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in Tables A through I, inclusive.

Twelve municipalities, eleven of which have a total sewered population of 21,900, discharge pollution to watercourses of the basin. Eight serving 20,920 people discharge sewage reduced by treatment to a population equivalent of 15,975. The amount of pollution discharged by four municipalities is not available.

Eleven industries discharge waste directly to streams, nine of which produce organic waste having a population equivalent of 60,000, one produces organic waste in undetermined quantity, one produces inorganic waste (also included in the group producing organic waste), and one produces waste of undetermined type.

Five of the twelve municipalities have primary treatment plants serving 3,720 people. Four have secondary treatment plants serving a population of 5,650. Of the eleven industries, four provide for waste treatment and seven have no treatment facilities.

The design capacity of six of the municipal treatment plants is satisfactory, one is unsatisfactory, and two are undetermined as to capacity. Operation of two of the municipal treatment plants is satisfactory, two are unsatisfactory, and five are undetermined as to operation. The design capacity of one of the industrial plants is unsatisfactory and that of three is undetermined. Operation at all four of these plants is undetermined.

There have been no municipal or industrial waste treatment plants constructed during the period 1946-1949.

Construction of three* new municipal sewage treatment plants to serve a population of 12,550 and three new industrial waste treatment plants, as well as additions to two existing municipal treatment plants serving 2,100 people and the replacement of another serving 2,580 are required to abate pollution in the basin. No project is required at four municipalities having a sewered population of 4,240 or at one industrial plant. Requirements are undetermined at two municipalities serving 450 people and at seven industrial plants.

Plans are under preparation at one municipality for construction of a treatment plant. The status with respect to seven municipalities and ten industries is undetermined.

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* Includes one plant for which no population served figure is available.

TABLE A (1)

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollutio Discharged to Wate course (In Terms o Equivalent number of People)
Having data on pollution load discharged to watercourse	8	20,925	15,975
Having population data available (Data on pollution load to watercourse incomplete or not available)	3	1,000	Not Applicable
TOTAL	**12	21,920	X X X X X X

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

**Total includes one source of pollution for which no population served or pollution discharged figures are available.

TABLE B (1)

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	9	60,000
Producing Organic Wastes	1	Undetermined
Producing Inorganic Wastes	*1	Not Applicable
Producing Wastes of Undetermined Type	1	Undetermined
TOTAL	**11	xxx xxx

* Also producing organic wastes

** Total adjusted to correct for duplication noted in footnote marked thus, * .

TABLE C (1)

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number Municipalities*	Number Plants	Population Served
Primary	5	5	3,720
Secondary	4	4	5,650
No Treatment	**2	XXXX	12,550

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes one additional municipality, with no treatment for which no population served figure is given.

TABLE $D_{(1)}$

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

		Number of Industrial Plants Having:		
Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Food and kindred products	9	3	6	
Chemical and allied products	1	0	1	0
Miscellaneous	1	1	0	0

* Industries having separate outlets and discharging wastes directly to watercourse.

TABLE E$_{(1)}$

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to: Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	9	6	1	2	2	2	5
Industrial	4	0	1	3	0	0	4

TABLE F(1)

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv.No.People)
1946	0	-	0	-
1947	0	-	0	-
1948	0	-	0	-
1949	0	-	0	-

TABLE G (1)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number	Population Served by Facilities	Number
New Plant	*2	12,550	3
Enlargement or Additions to Existing Plant	2	2,100	0
Replace Existing Plant	1	2,580	0
		17,230	
No Project Required	4	4,240	1
Undetermined	2	450	7
		21,870	

* Includes one plant for which no population served figure is given.

TABLE $H_{(1)}$

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number	
	Municipal	Industrial
No Formal Action	0	0
Abatement Ordered	0	0
Plans under Preparation	1	0
Final Plans Approved	0	0
Construction Awaiting Financing	0	0
Under Construction	0	0
Status Undetermined	7	10

TABLE I(1)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1, 1950

Name	Population Served	Project Requirements	Remarks
Falmouth	300	New Plant	
Fredericksburg	12,250	New Plant	
Fredericksburg Country Club	Not Known	New Plant	
Madison	100	Undetermined	
Marshall	100	Addition to Existing Plant	
Orange	2,580	Replace Existing Plant	
Warrenton	2,000	Addition to Existing Plant	
Woodberry Forest School	350	Undetermined	
Food and Kindred Products	Not Known	Seven Undetermined	
Food and Kindred Products	Not Known	Two New Plants	
Chemical and Allied Products	Not Known	One New Plant	
	17,680		

SUB-BASIN 2

YORK RIVER BASIN

GENERAL DESCRIPTION

The York River Basin is bounded on the northwest and northeast by the Rappahannock River Basin, on the east by Chesapeake Bay, and on the south and southwest by the James River Basin. The basin occupies about 2,728 square miles and lies entirely within the Commonwealth of Virginia.

The York River is formed by the confluence of the Mattaponi and Pamunkey Rivers which originate on the Piedmont Plateau. These streams are tidal up to the "fall line". As late as 1936 this basin was largely woodland with only a small portion under cultivation.

The climate of the basin is classed as humid with average annual rainfall varying from about forty to forty-six inches. Except for summer storms, the rainfall is rather evenly distributed throughout the year. The mean annual temperature varies from fifty-five to fifty-eight degrees. The growing season averages about 250 days annually.

The total population of the basin based upon the 1940 census was approximately 81,235. The preliminary 1950 census reports indicate a population of 90,046.

ECONOMIC DEVELOPMENT

The basin contains only one urban community which comprises three percent of the basin population. Farming is the chief economic activity of the region with livestock, dairying, truck farming and poultry raising constituting the principal types. Industries are few and scattered, but one large pulp plant is located at West Point. Oystering and fishing are a major source of livelihood near the York estuary and along the shores of Chesapeake Bay.

USE OF WATER RESOURCES

There are seventeen public water supplies in the basin serving 8,141 people. Only one of these serving 2,000 persons is from a surface source.

Commercial fishing and oystering are other important water resources being utilized.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in Tables A through I, inclusive.

There are eleven sources of municipal pollution in the basin. No population served data is available for three of these. The remaining eight serve 6,050 persons and their sewage is reduced to a population equivalent of 5,565 prior to discharging to streams. There are four industrial plants discharging waste to streams. One produces organic waste having a population equivalent of 110,000, three produce organic waste of undetermined quantity, and one of these also discharges inorganic waste.

Of the eleven municipalities, two serving 265 persons have primary treatment plants. Five have secondary treatment facilities, two of which serve 500 persons. The population served by the remaining three is not given for military reasons. Four municipalities having a sewered population of 5,285 provide no treatment. None of the four industries have waste treatment facilities.

Of seven municipal treatment plants two are satisfactory, one is unsatisfactory, and four are undetermined with respect to design capacity and operation.

No municipal or industrial waste treatment plants have been constructed in the basin during the period 1946-1949.

Six new plants (two at one community) are needed to serve a population of 5,420. No project is required at two communities now serving 500 persons. The needs are undetermined at one community, which has a sewered population of 130, and at three Navy installations for which no population served figures are given. One new industrial plant is needed and the needs of three are undetermined.

Plans are under preparation at one community for the construction of treatment facilities and final plans have been approved for two others. The status is undetermined at seven municipalities and four industries.

TABLE A (2)

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to Watercourse (In Terms of Equivalent number of People)
Having data on pollution load discharged to watercourse	8	6,050	5,565
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	-	
TOTAL	11**	6,050	

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes three sources of pollution, consisting of U.S. Navy installations in York County, for which no population served or pollution discharged figures are available.

TABLE B(2)

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	1	110,000
Producing Organic Wastes	3	Undetermined
Producing Inorganic Wastes	1*	Not Applicable
Producing Wastes of Undetermined Type	0	Undetermined
TOTAL	4**	xxx xxx

*Also producing organic wastes

**Total adjusted to correct for duplication noted in footnote marked thus, *.

TABLE C (2)

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number Municipalities*	Plants	Population Served
Primary	2	2	265
Secondary	5 **	5**	500
No Treatment	4	XXXX	5,285
TOTAL			

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes 3 U.S. Navy installations for which population served data are not given.

TABLE D(2)

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

		Number of Industrial Plants Having:		
Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Food and kindred products	2	0	2	0
Paper and allied products	1	0	1	0
Fabricated metal products	1	0	1	0

* Industries having separate outlets and discharging wastes directly to watercourse.

TABLE E(2)

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to:					
		Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	7	2	1	4	2	1	4
Industrial	0	-	-	-	-	-	-

TABLE F(2)

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv.No.People)
1946	0	-	0	-
1947	0	-	0	-
1948	0	-	0	-
1949	0	-	0	-

TABLE G(2)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number	Population Served by Facilities	Number
New Plant	6	5,420	1
Enlargement or Additions to Existing Plant	0	-	0
Replace Existing Plant	0	-	0
No Project Required	2	500	0
Undetermined	4*	130	3

* Includes 3 U.S. Navy Installations for which no population served figures are given.

TABLE H(2)

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number	
	Municipal	Industrial
No Formal Action	0	0
Abatement Ordered	0	0
Plans under Preparation	1	0
Final Plans Approved	2	0
Construction Awaiting Financing	0	0
Under Construction	0	0
Status Undetermined	7	4

TABLE I (2)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1, 1950

Name	Population Served	Project Requirements	Remarks
Ashland, Va.	2,225	New Plant	
Hanover Ind. School	410	New Plant	Plans Prepared
Louisa,Va. (Mun.)	550	New Plant	
Peak's Ind.School	135	New Plant	
West Point,Va. (1)	1,050	New Plant	Plans Approved
West Point,Va. (2)	1,050	New Plant	Plans Approved
Louisa County,Va.	130	Undetermined*	
Naval Supply Depot York County	Not Known	Undetermined**	
Navy Mine Depot York County	Not Known	Undetermined**	
Navy Mine Warfare School	Not Known	Undetermined**	
Paper and Allied Products	110,000	One New Plant	
Food and Kindred Products	Not Known	Two New Plants	
Fabricated Metal Products	Not Known	One New Plant	

* Has primary treatment plant at present.
**Has secondary treatment plant.

SUB-BASIN 3

JAMES RIVER BASIN

GENERAL DESCRIPTION

The James River Basin is bounded on the west and north by the Kanawha River Sub-basin and Potomac River Basin, on the north by the Rappahannock and York River Basins, on the east by Chesapeake Bay, and on the south by the Coastal Area, and the Chowan and Roanoke River Basins.

The river system rises in the Great VAlley of Virginia and flows in a general easterly direction through the Blue Ridge Mountains, the Piedmont Plateau and the Coastal Plain into the lower end of Chesapeake Bay. The total drainage area is 10,060 square miles, practically all of which is in the Commonwealth of Virginia, a small area of relatively minor importance being located in the State of West Virginia. Important tributaries are the Cow Pasture and Jackson Rivers, joining to form the James in the Alleghany Mountains near Clifton Forge, Virginia; the Rivianna and North Rivers above Richmond, the Chickahominy and Appomattox Rivers below Richmond.

The mean annual rainfall varies from about thirty-nine inches in the western part of the basin to forty-five in the eastern portion. A twelve year record at the U.S. Geological Survey gauge at Richmond, Virginia, where the watershed area is 6,757 square miles, indicates an average discharge of 7,244 cubic feet per second. The maximum discharge at this point was 175,000 cubic feet per second, and the minimum was 46 cubic feet per second.

The mean annual temperature varies from about fifty-four degrees to nearly fifty-nine degrees. The climate is classed as humid.

The population of the basin was 972,517 based on the 1940 census, sixty percent of which was urban. The preliminary 1950 census indicates the population to be 1,203,533 and to have remained sixty percent urban.

ECONOMIC DEVELOPMENT

There are twenty urban communities in the James River Basin, seven of which have populations in excess of 25,000. The largest of these, Richmond, is the capitol of the Commonwealth.

Although the basin is approximately seventy percent woodland, it is a heavy producer of agricultural products including tobacco, cotton, peanuts, corn, grains, fruits and truck crops. Norfolk and Princess Anne Counties are particularly important producers of truck crops which find a ready market in the nearby heavily industrialized Hampton Roads area. Isle of Wight County is a large producer of peanuts and principal products of the mountain valleys include apples and peaches.

Industry is highly developed in the urban areas producing textiles, pulp, cast-iron pipe, building materials, chemicals, processed foods, ships and ship repairs.

Hampton Roads in the estuary of the James River, adjacent to which is located the cities of Norfolk, Portsmouth and Newport News, is one of the nation's finest harbors. In 1947 and 1948 it cleared almost half the total export tonnage shipped from all principal Atlantic Coast ports, a large part being coal. Oystering is also of commercial importance in the estuary of the James River.

USE OF WATER RESOURCES

There are eighty-five public water supplies in the basin serving a population of 817,078. Twenty-four of these are wholly or partly from surface sources and serve 777,990 people.

Recreational resources on the river have been little developed. Some water fowl hunting occurs in the lower part of the basin.

A number of small dams have been constructed on the river. Other developments, primarily for hydroelectric power, have been proposed.

The estuary of the river is very extensively navigated and extensive port facilities have been developed there. Commercial oystering is also important in this portion of the river and oyster bed management is practiced by the individual operators. Commercial fishing is also done here.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in Tables A through I, inclusive.

There are ninety-one municipal sources of pollution in the basin serving a sewered population of more than 924,266. (Six municipalities are included for which no population served data are available.) Seventy-five of these municipalities serve a population of 484,511, but sewage treatment at several reduce this to a population equivalent of 451,400. Eleven (one also included in the previously listed seventy-five as having data on pollution discharged for part of its population) serve a population of 439,755, but the data on pollution load to watercourses for these are incomplete.

There are fifty-six industrial sources of pollution in the basin with outlets direct to watercourses. Nine produce organic waste having a combined population equivalent of 838,300, thirty-four produce organic waste of undetermined strength, twelve produce inorganic waste (including two also listed as producing organic waste), and three produce waste of an undetermined type.

Of the ninety-one municipalities having sewage systems, twenty-two have twenty-three primary treatment plants and serve more than 470,806 people (includes one municipality for which no population served figure is available). Twenty-five municipalities have twenty-seven secondary treatment plants serving more than 36,370 (includes one municipality for which no population served figure is available).

Forty-five municipalities have sewage systems serving more than 417,900 people, but provide no treatment (includes four for which no population served figure is available, and one municipality which is also included with those having primary treatment). Of the fifty-six* industries, fifteen provide treatment, thirty-eight* provide no treatment, and three have undetermined facilities.

With respect to the adequacy of existing treatment facilities, the design capacity of thirty-two municipal plants is satisfactory, that of four is unsatisfactory, and that of fourteen is undetermined. The operation of twenty-one of these plants is satisfactory, and that of twenty-nine is undetermined. Of the industrial plants, the design capacity of five is satisfactory, that of one is unsatisfactory, and that of nine is undetermined. With respect to operation, five are satisfactory and the status of ten is undetermined.

During the period 1946-1949, nine new municipal waste treatment plants to serve a design population of 483,500 were completed. No industrial waste treatment plants were built during the same period.

Fifty-one new municipal treatment plants (including three for which no population served figures are available) to serve more than 438,015 people, enlargement of two plants to serve

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* Total adjusted to correct for duplication.

15,400 people and replacement of two plants to serve 750 persons are required to abate pollution in the basin. No project is required at thirty-two municipalities (two with no population served figures) serving 464,451 people. Requirements at eight municipalities, (one military installation with no population served figure available) with sewer systems serving in excess of 5,650 persons, is undetermined. Thirty-one new industrial plants are needed to abate pollution, six require no project, and the requirements of nineteen are undetermined.

No formal action has been taken with forty-one municipalities and thirty industries with respect to treatment works projects. Plans for projects are under preparation at eleven municipalities and one industry. Final plans for projects have been approved for two municipalities. The status at eight municipalities and nineteen industries remains undetermined.

TABLE A (3)

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to Watercourse (In Terms of Equivalent number of People)
Having data on pollution load discharged to watercourse	75	484,511	451,400
Having population data available (Data on pollution load to watercourse incomplete or not available)	**11	439,755	Not applicable
TOTAL	*** 91	924,266	XXX XXX

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes one municipality also listed as having data on pollution load discharged to watercourse, for part of its population.

*** Includes six municipalities for which no population served or pollution discharged figures are available. Total adjusted to correct for duplication noted in footnote marked thus, **.

TABLE B(3)

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	9	838,300
Producing Organic Wastes	34	Undetermined
Producing Inorganic Wastes	*12	Not Applicable
Producing Wastes of Undetermined Type	3	Undetermined
TOTAL	** 56	xxx xxx

* Includes two plants also producing organic wastes.

** Total adjusted to correct for duplication noted in footnote marked thus, *.

TABLE C(3)

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number Municipalities*	Plants	Population Served
Primary	** 22	23	470,806
Secondary	** 25	27	36,370
No Treatment	*** 45	XXXX	417,090

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

*** Includes four municipalities for which no population served figures are available and one municipality also included in primary treatment.

** Includes one municipality for which no population served figure is available.

TABLE $D_{(3)}$

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

Number of Industrial Plants Having:

Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Food & Kindred Products	25	5	20	0
Textile Mill Products	4	1	3	0
Paper & Allied Products	8	1	6	1
Chemical & Allied Products	**8	2	** 4	2
Leather & Leather Products	2	1	1	0
Primary Metal Industries	1	0	1	0
Fabricated Metal Products	1	1	0	0
Miscellaneous	9	4	5	0

** Includes one plant also listed in Textile Mill Products and one plant also listed in Paper and Allied Products.

* Industries having separate outlets and discharging wastes directly to watercourse.

TABLE E (3)

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to: Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	50	32	4	14	21	0	29
Industrial	15	5	1	9	5	0	10

TABLE $F_{(3)}$

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv.No.People)
1946	0	-	0	-
1947	3	200,000	0	-
1948	2	182,500	0	-
1949	4	101,000	0	-

TABLE G (3)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number	Population Served by Facilities	Number
New Plant	* 51	438,015	31
Enlargement or Additions to Existing Plant	2	15,400	0
Replace Existing Plant	2	750	0
No Project Required	** 32	464,451	6
Undetermined	*** 8	5,650	19

* Includes three municipalities for which no population served figures are available.

** Includes two municipalities for which no population served figures are available.

*** Includes Fort Lee, U.S. Army Installation, for which no population served figures are available.

TABLE H (3)

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number	
	Municipal	Industrial
No Formal Action	41	30
Abatement Ordered	0	0
Plans under Preparation	11	1
Final Plans Approved	2	0
Construction Awaiting Financing	0	0
Under Construction	0	0
Status Undetermined	8	19

TABLE I(3)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1, 1950

Name	Population Served	Project Requirements	Remarks
Virginia Municipalities			
Alleghany, County of	575	New Plant	
Beaumont Ind.School	350	New Plant	
Big Island Ind. Establishment*	25	New Plant	
Bland Sanitary Dist.	3,000	New Plant	Plans Prepared
Buena Vista	2,600	New Plant	
Charlottesville, (Part #1)	11,000	New Plant	
Charlottesville, (Part #2)	10,000	Enlarge Existing Plant	
Blue Ridge Sanatorium	500	Replace Existing Plant	
Clifton Forge	6,900	New Plant	
Colonial Heights	6,000	New Plant	
Negro College	1,600	New Plant	
Covington	6,800	New Plant	Plans Prepared
Boy's Home Inc.	90	New Plant	
Crewe	3,000	New Plant	Plans Prepared
Crozet, Montague Est.	100	New Plant	

Name	Population Served	Project Requirements	Remarks
Virginia Municipalities			
Ettrick, San. Dist.	1,370	New Plant	
Farmville	4,500	New Plant	
Ind. Establishment*	100	New Plant	
Ferguson Park	3,500	Undetermined	
Fork Union Military Academy	650	New Plant	
Fincastle School	625	New Plant	
Fort Lee	Undetermined	Undetermined	
Henrico County			
Laurel Links, Inc.	300	Undetermined	
Hopewell	10,100	New Plant	Plans Prepared
Ind. Establishment*	1,600	New Plant	Final Plans Approved
Ind. Establishment*	1,300	New Plant	
Huntington Heights	400	Undetermined	
Iron Gate	655	New Plant	
Fordwick			
Ind. Establishment*	250	Undetermined	
Lexington	7,000	New Plant	
Lynchburg	49,000	New Plant	Final Plans Approved
State Colony	1,900	New Plant	
Madison Heights Sanitary Dist.	935	New Plant	
Misdemeanant Farm	500	Undetermined	

3-I-3

Name	Population Served	Project Requirements	Remarks
Virginia			
Municipalities			
New Castle	800	New Plant	
Norfolk(Part #1)	1,200	New Plant	Plans under Preparation
Norfolk(Part #2)	1,200	New Plant	Plans under Preparation
Norfolk County			
Crestwood Subdivision	1,200	New Plant	
East Estabrook	400	New Plant	
Engleside Subdivision	400	New Plant	
Foxhall Subdivision	240	New Plant	
Great Bridge School	250	Replace Existing Facilities	
Norview	1,500	New Plant	
Portlock Subdivision	500	New Plant	
West Estabrook	400	New Plant	
Municipalities			
Petersburg	36,000	New Plant	
State Hospital	4,500	New Plant	
State Colony	325	New Plant	
Portsmouth			
U.S. Naval Hospital	Undetermined	New Plant	Plans under Preparation
U.S. Norfolk Naval Shipyard	Undetermined	New Plant	Plans under Preparation

Name	Population Served	Project Requirements	Remarks
Virginia **Municipalities**			
Richmond	250,000	New Plant	Plans under Preparation
Ind.Establishment*	5,000	New Plant	
Ind.Establishment*	55	New Plant	
Ind.Establishment*	100	New Plant	Plans under Preparation
Ind.Establishment*	Undetermined	New Plant	
Masonic Home	200	New Plant	
St. Emmas Institute	300	Undetermined	
Scottsville	450	New Plant	
Selma	200	New Plant	
State Ind. Farm for Women	270	New Plant	
Suffolk	11,300	New Plant	Plans under Preparation
Virginia State Farm	400	Undetermined	
Williamsburg	5,400	Enlarge Existing Facilities	
Industrial			
Food and Kindred Products	Undetermined	Fifteen New Plants	
Food and Kindred Products	70,000	One Undetermined	
Food and Kindred Products	Undetermined	Seven Undetermined	
Textile Mill Products	20,400	Two New Plants	

Name	Population Served	Project Requirements	Remarks
Virginia **Industrial**			
Textile Mill Products	Undetermined	One New Plant	
Paper & Allied Products	697,600	Three New Plants	
Paper & Allied Products	Undetermined	Two New Plants	
Paper & Allied Products	Undetermined	Two Undetermined	
Chemical and Allied Products	50,000	One New Plant	
Chemical and Allied Products	Undetermined	Three New Plant	
Chemical and Allied Products	Undetermined	Two Undetermined	
Leather and leather Products	Undetermined	One New Plant	Plans Prepared
Leather and leather Products	Undetermined	One Undetermined	
Primary Metal Industries	Undetermined	One Undetermined	
Fabricated Metal Products	Undetermined	One Undetermined	
Miscellaneous	Undetermined	Three New Plants	
Miscellaneous	Undetermined	Four Undetermined	

* Domestic Sewage

SUB-BASIN 4

CHOWAN RIVER BASIN

GENERAL DESCRIPTION

The Chowan River Basin is bounded on the north and east by the James River Basin, on the east by the Coastal Area, and on the southwest by the Roanoke River Basin. The main river is formed by the confluence of the Blackwater and Nottoway Rivers near the North Carolina-Virginia line and flows in a southerly direction to Albemarle Sound. A principal tributary, the Meherrin River also rises in southern Virginia. The basin embraces a total drainage area of about 5225 square miles of which 4050 square miles are in Virginia and 1,175 are in North Carolina.

The Chowan River and its tributaries drain an area mainly in the Coastal Plain. At low stage, tidal effect is felt on the Blackwater River above Franklin, Virginia.

The climate of the basin is classed as humid. The mean annual temperature is approximately fifty-nine degrees. The average annual rainfall varies with location from about forty-four inches to over forty-eight inches. A seven year record at the U.S. Geological Survey gauge near Sebrell, Virginia on the Nottoway River, where the drainage area is 1,451 square miles, indicates a maximum discharge of 25,000 cubic feet per second and a minimum of twelve cubic feet per second. A four year record on the Blackwater River near Franklin, Virginia, where the drainage area is 613 square miles, indicates a maximum discharge of 5360 cubic feet per second and a minimum of four tenths cubic foot per second. An eighteen year record of the gauge near Lawrenceville, Virginia on the Meherrin River, where the drainage area is 553 square miles, indicates an average cubic foot per second discharge of 504, a maximum of 38,000, and a minimum of five.

The population of the Chowan River Basin was 210,474 based on the 1940 census. The preliminary 1950 census indicates the population to be 222,259.

ECONOMIC DEVELOPMENT

There were five urban communities in the basin in 1950 comprising ten percent of the population. Three of these are in Virginia.

The chief economic activities of the basin are farming and commercial fishing. The farming is diversified; the chief crops being tobacco, cotton, peanuts, corn, potatoes, grains and truck crops. In 1945 two counties in the basin were among the leading tobacco producers in the United States; and several were among the leading peanut producing counties.

The industrial developments in the area are few in number. Those in North Carolina are negligible. In Virginia diversified small scale manufacturing is done with paper and pulp products, and lumber and wood products being the most important.

USE OF WATER RESOURCES

There are twenty-nine public water supplies located in the basin which serve a total population of 46,890. Of these only three, serving 8100 people, are from surface sources.

The lower reach of the Chowan River is used for bathing, sailing and sport fishing. The commercial fishery is of considerable value there, especially during the spring herring run.

The Chowan River is navigable for a distance of fifty miles, with a controlled depth of twelve feet to the mouth of the Meherrin River and nine feet to the Virginia-North Carolina State line. The Meherrin River is navigable, with a depth of ten feet and channel width of a hundred feet to Murfreesboro, North Carolina about twelve miles above its mouth.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in Tables A through I, inclusive.

There are twenty-six sources of municipal pollution in the basin. Twenty of these serve 28,252 people but the sewage strength is reduced by treatment at several to a population equivalent of 24,282. The data on pollution load of six other communities* serving more than 4,340 persons is not available.

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* Includes one military installation and one mill village for which no population served or pollution discharge figures are available.

There are ten sources of industrial waste in the basin which are discharged directly to watercourses. Two produce organic wastes having a population equivalent of 37,940. Eight produce organic waste of undetermined strength. One of these industries also produces inorganic waste.

Of the twenty-six municipal pollution sources, fifteen* have eighteen primary treatment plants serving a population of more than 13,185, five** have secondary treatment plants serving more than 1,625 people, and six municipalities provide no treatment.

Of the ten industries, two have waste treatment facilities, seven have none, and that at one is undetermined.

Of the twenty-three municipal treatment plants, twelve are satisfactory with respect to design capacity, six are unsatisfactory, and the classification of five is undetermined. The adequacy of operation of eleven plants is satisfactory, four are unsatisfactory, and that of eight is undetermined. The design capacity of one of the industrial waste treatment plants is satisfactory and that of the other is undetermined. The adequacy of operation of both industrial waste treatment plants is undetermined.

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* Includes one mill village for which no population served figure is available.

** Includes one military institution for which no population served figure is available.

During the period 1946-1949 one new municipal waste treatment plant to serve a population of 1,000 was completed. No industrial waste treatment plants were constructed.

Six new municipal plants to serve a population of 14,782, five new industrial waste treatment plants, and ten additions or enlargements to existing municipal plants serving 8,400 people are needed to abate pollution in the basin. No project is required at eight communities having a sewered population of 6,545. Needs at six municipalities with a sewered population of 2,865 and at five industries remain undetermined.

No formal action has been taken with thirteen municipalities and five industries to abate pollution. Final plans for abatement have been approved at two municipalities. The status at six municipalities and five industries is undetermined.

TABLE A(4)

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to Watercourse (In Terms of Equivalent number of People)
Having data on pollution load discharged to watercourse	20	28,252	24,282
Having population data available (Data on pollution load to watercourse incomplete or not available)	** 6	4,340	Not applicable
TOTAL	26	32,592	XXX XXX

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes Camp Pickett, U.S. Army installation, and one mill village for which no population served or pollution discharged figures are available.

TABLE B(4)

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People
Producing Organic Wastes	2	37,940
Producing Organic Wastes	8	Undetermined
Producing Inorganic Wastes	* 1	Not Applicable
Producing Wastes of Undetermined Type	0	Undetermined
TOTAL	** 10	xxx xxx

* Includes also under organic wastes.

** Total adjusted to correct for duplication noted in footnote marked thus, *.

TABLE C(4)

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number Municipalities*	Plants	Population Served
Primary	**15	18	13,185
Secondary	*** 5	5	1,625
No Treatment	6	XXXX	17,782

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal Sewage systems.

*** Includes Camp Pickett, U.S. Army installation for which no population served figure is available.

** Includes one mill village for which no population served figure is available.

TABLE D (4)

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

		Number of Industrial Plants Having:		
Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Food & Kindred Products	7	1	5	1
Textile Mill Products	1	0	1	0
Paper & Allied Products	2	1	1	0
Chemical & Allied Products	**1	*** 1	0	0

* Industries having separate outlets and discharging wastes directly to watercourse.

** Included also under Paper and Allied Products.

*** Facility the same as listed under Paper and Allied Products.

TABLE $E_{(4)}$

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to:					
		Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	23	12	6	5	11	4	8
Industrial	2	1	0	1	0	0	2

TABLE $F_{(4)}$

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv. No. People)
1946	0	-	0	-
1947	0	-	0	-
1948	0	-	0	-
1949	1	1,000	0	-

TABLE G (4)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number	Population Served by Facilities	Number
New Plant	* 6	14,782	5
Enlargement or Additions to Existing Plant	**10	8,400	0
Replace Existing Plant	0	-	0
No Project Required	8	6,545	0
Undetermined	*** 6	2,865	5

* Includes two new plants at one municipality.

** Includes two additions at one municipality, and two enlargements at one municipality.

*** Includes one municipality with two outfalls, one of which is included under Enlargement or Additions to Existing Plant.

TABLE $H_{(4)}$

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number Municipal	Industrial
No Formal Action	13	5
Abatement Ordered	0	0
Plans under Preparation	0	0
Final Plans Approved	2	0
Construction Awaiting Financing	0	0
Under Construction	0	0
Status Undetermined	6	5

TABLE I(4)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1, 1950

Name	Population Served	Project Requirements	Remarks
North Carolina Municipalities			
Ahoskie	2,300	Addition to Two Plants	
Aulander	550	Addition to Plant	
Murfreesboro	900	New Plant	
Industries			
Food & Kindred Products	Not Known	Four Undetermined	
Virginia Municipalities			
Boykins	800	Addition to Plant	
Camp Picket	Not Known	Undetermined	
Emporia	5,500	New Plant	
Franklin	5,000	New Plant	Final Plans Approved
Jarratt	600	Undetermined	
Mill Village	Not Known	Undetermined	
Kenbridge	1,000	Addition to Plant	
Lawrenceville #1	1,700	New Plant	
Lawrenceville #2	800	New Plant	
St.Paul's Poly. Institute	882	New Plant	
McKenney	800	Addition to Plant	

2-I-2

Name	Population Served	Project Requirements	Remarks
Piedmont Sanatorium	300	Enlarge Existing Plant	Final Plans Approved
South Hill #1	265	Undetermined	
South Hill #2	1,050	Enlarge Existing Plant	
Victoria #1	800	Enlarge Existing Plant	
Victoria #2	800	Enlarge Existing Plant	
Wakefield	700	Undetermined	
Waverly	1,300	Undetermined	
Industries			
Food & Kindred Products	Not Known	Three Undetermined	
Textile Mill Products	Not Known	One New Plant	
Paper & Allied Products	37,000	Two Undetermined	

SUB-BASIN 5

ROANOKE RIVER BASIN

GENERAL DESCRIPTION

The Roanoke River Basin is bounded on the north and northeast by the James and Chowan River Basins; on the southeast by the Coastal Area; on the south by the Tar, Neuse, Cape Fear and Yadkin-Pee Dee River Basins; and on the west by the Kanawha River Sub-basin.

The Roanoke River arises in the Great Valley of Virginia. It flows southeasterly across the Piedmont Plateau entering North Carolina just above the town of Roanoke Rapids 240 miles from its source. In North Carolina it continues a southeasterly course for 160 miles to empty into Batchelor's Bay, an arm of Albemarle Sound. Its drainage area is approximately 9,630 square miles, of which about 6,300 are in Virginia and 3,330 are in North Carolina.

The principal tributary of the Roanoke River is the Dan River which arises in western Virginia and crosses the North Carolina-Virginia State line four times before joining the Roanoke near Clarksville, Virginia. The Dan River is 210 miles long and drains an area of 2,350 square miles.

The mean annual temperature varies from approximately fifty-nine degrees near the coast to fifty-six degrees at Roanoke, Virginia. The average annual rainfall varies from forty inches in the western part of the basin to forty-four inches near the coast. Rainfall is fairly well distributed throughout the year. A thirty-five year record of the U.S. Geological Survey gauge at Roanoke Rapids, North Carolina, where the drainage area is 8,410 square miles, shows the average discharge in cubic feet per second to be 8,326, the maximum to be 261,000, and the minimum regulated flow to be 458.

The population of the basin, based on the 1940 census, was 637,737. The preliminary 1950 census indicates the population to be 684,834.

ECONOMIC DEVELOPMENT

There are fifteen urban communities in the basin and part of a sixteenth which together constitute twenty-nine percent of the total population. These communities are evenly divided between North Carolina and Virginia. Roanoke and Danville, both in Virginia, have populations in excess of 30,000.

The basin is primarily one of agricultural although industry is of importance. The principal farm crops are tobacco, cotton, corn, peanuts, potatoes, grains, fruits and vegetables. In 1945 several counties were among those in the nation leading in tobacco production, four were in the first hundred in apple production, and one each held this rank in peach, fresh bean, and tomato production.

The basin contains several important textile milling and processing cities. Other industries of importance are tobacco and food processing, and pulp and paper milling. Roanoke and Danville, Virginia are extensively diversified industrial centers.

The lower reaches of the Roanoke River below Roanoke Rapids, North Carolina provide a valuable commercial fishery.

USE OF WATER RESOURCES

There are sixty-three public water supplies in the basin serving 202,975 people. Twenty-five of these take all or part of their supply from surface sources and service a population of 165,105.

The only conspicuous recreational facilities offered in the basin is the boating, bathing, fishing, and camping in the lower coastal areas. This area also is attractive to large numbers of wild ducks and geese during the winter months.

The spring runs of herring, shad, and rockfish support commercial fishing in the lower part of the river.

Navigation is possible on the river by a controlled depth of nine feet to Hamilton, sixty-two miles above its mouth, and three feet to Weldon.

Several privately owned hydroelectric developments exist in the basin. The Federal Government now has under construction dams for power and flood control at Buggs Island on the Roanoke River and on the Smith River at Philpott, both in Virginia.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in Tables A through I, inclusive.

There are fifty-two* sewered municipalities in the basin serving more than 203,845 persons. Forty-seven of these municipalities having a combined population of 202,755 discharge waste with a population equivalent of 193,076. Of these fifty-two municipalities, fifteen have seventeen primary treatment plants, eleven** provide secondary treatment, and twenty-seven have no treatment facilities.

There are forty-two industries discharging waste directly to streams. Four produce organic waste with a population equivalent of 122,750. Thirty-five others produce organic waste of undetermined strength. Three(including one also producing organic waste) produce inorganic waste. One produces waste of undetermined type. Of these, eight have treatment plants.

Of the twenty-eight municipal treatment plants, the design capacity of four is unsatisfactory and that of four others is undetermined. The adequacy with respect to operation of twenty is satisfactory and that of the remainder is undetermined. Of the eight industrial waste treatment plants, six are satisfactory with respect to design capacity and operation while the classification of two is undetermined.

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* Includes three municipalities for which no population served or pollution discharged figures are available.

** Includes one also listed with those having primary treatment.

A single new municipal treatment plant was constructed during the period 1946-1949 to serve 2,500 people. Twenty-seven new plants* to serve a population of over 170,574, enlargements at two plants serving 1,800 people, and twenty-two new industrial waste treatment plants are needed to abate pollution in the basin.

Final plans have been approved for the construction of one municipal plant, plans are under preparation for five others, and no formal action has been taken with respect to twenty-three municipal and twenty-two industrial waste treatment plants. The status at three municipalities and thirteen industries is undetermined.

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* Population served figure for one municipality is not available.

TABLE A(5)

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to Watercourse (In Terms of Equivalent number of People)
Having data on pollution load discharged to watercourse	47	202,755	193,076
Having population data available (Data on pollution load to watercourse incomplete or not available)	2	1,090	Not applicable
TOTAL	** 52	203,845	XXX XXX

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes three municipalities for which no population served or pollution discharged figures are available.

TABLE B(5)

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People
Producing Organic Wastes	4	122,750
Producing Organic Wastes	35	Undetermined
Producing Inorganic Wastes	* 3	Not Applicable
Producing Wastes of Undetermined Type	1	Undetermined
TOTAL	**42	xxx xxx

* Includes one plant also producing organic wastes.

** Total adjusted to correct for duplication noted in footnote marked thus, *.

TABLE C (5)

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number Municipalities*	Plants	Population Served
Primary	** 15	17	19,179
Secondary	*** 11	11	11,595
No Treatment	**** 27	XXXX	173,071

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes two municipalities for which no population served figures are available.

*** Includes one municipality also listed under primary treatment.

**** Includes one municipality for which no population served figure is available.

TABLE D(5)

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

Type Industry	Number of Plants	Number of Industrial Plants Having: Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Food & Kindred Products	23	1	22	0
Textile Mill Products	15	6	9	0
Paper & Allied Products	1	0	1	0
Chemical & Allied Products	**2	1	** 1	0
Fabricated Metal Products	1	0	1	0
Miscellaneous	1	0	1	0

** Includes one plant also listed under textile mill products.

* Industries having separate outlets and discharging wastes directly to watercourse.

TABLE $E_{(5)}$

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to:					
		Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	28	20	4	4	20	0	8
Industrial	8	6	0	2	6	0	2

TABLE $F_{(5)}$

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv.No.People
1946	0	-	0	-
1947	0	-	0	-
1948	0	-	0	-
1949	1	2,500	0	-

TABLE G $_{(5)}$

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number	Population Served by Facilities	Number
New Plant	*27	170,574	22
Enlargement or Additions to Existing Plant	2	1,800	0
Replace Existing Plant	0	-	0
No Project Required	**20	29,971	7
Undetermined	3	1,500	13

* Includes one municipality for which no population served figure is available.

** Includes two municipalities for which no population served figures are available.

TABLE H (5)

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number	
	Municipal	Industrial
No Formal Action	23	22
Abatement Ordered	0	0
Plans under Preparation	5	0
Final Plans Approved	1	0
Construction Awaiting Financing	0	0
Under Construction	0	0
Status Undetermined	3	13

TABLE I(5)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1, 1950

Name	Population Served	Project Requirements	Remarks
North Carolina Municipalities			
Draper Sanitary District	3,573	New Plant	Plans under Preparation
Leaksville	1,360	New Plant	Plans under Preparation
Madison	1,000	New Plant	
Mayodan	1,300	Enlarge Plant	
Roanoke Rapids	8,545	New Plant	
Stoneville	500	Enlarge Plants	
Walnut Cove	500	New Plant	
Windsor	1,000	New Plant	
Industries			
Textile Mill Products	26,000	Two New Plants	Plans under Preparation for one plant
Paper & Allied Products	96,000	One Undetermined	
Virginia Municipalities			
Altavista	4,000	New Plant	
Ind. Establishment	1,000	New Plant	
Bedford	3,650	New Plant	Plans under Preparation
Ind. Establishment*	None	New Plant	Plans under Preparation

Name	Population Served	Project Requirements	Remarks
Virginia Municipalities			
Brookneal	600	New Plant	
Chatham	1,800	New Plant	
Chatham Hall	200	Undetermined	
Clarksville	900	New Plant	
Danville	40,000	New Plant	
Ind.Mill Village*	7,500	New Plant	
Ferrum Junior College	200	New Plant	
Gretna	700	Undetermined	
Halifax	600	Undetermined	
Manchester Court Subdivision	100	New Plant	
Martinsville	12,000	New Plant	
Orchard Heights & Orchard Court Subdivisions	125	New Plant	
Roanoke	62,000	New Plant	Final Plans Approved
Rocky Mount	1,566	New Plant	
Salem	6,500	New Plant	Plans Prepared
South Boston	5,500	New Plant	
South Hill	880	New Plant	
South Salem	1,200	New Plant	
Stuart	775	New Plant	
Vinton	3,700	New Plant	

Name	Population Served	Project Requirements	Remarks
Virginia **Industrial**			
Food & Kindred Products	Not known	Twelve New Plants	
Food & Kindred Products	Not known	Ten Undetermined	
Textile Mill Products	1,550	Two New Plants	
Textile Mill Products	Not known	Four New Plants	
Textile Mill Products	Not known	Two Undetermined	One has primary treatment and is considering further treatment in city system.
Fabricated Metals Products	Not known	One New Plant	
Undetermined	Not known	One New Plant	

* Domestic Sewage

SUB-BASIN 6

TAR RIVER BASIN

GENERAL DESCRIPTION

The Tar River Basin is bounded on the north by the Roanoke River Basin, on the east by the Coastal Area, and on the southwest by the Neuse and Cape Fear River Basins. The basin, which lies entirely within the State of North Carolina, covers about 4,200 square miles. The drainage area includes that of the Tar River proper and the estuary which is known as the Pamlico River.

The Tar River arises in the Piedmont Plateau and flows in a general southeasterly direction across the Coastal Plain to Pamlico Sound. The basin has a straightline length of about 160 miles and an average width of 30 miles. The river itself is 180 miles long where it becomes the Pamlico River 40 miles above Pamlico Sound.

The mean annual temperature varies from fifty-nine degrees at the northwest end of the basin to sixty-one degrees near the southeastern portion. Rainfall averages from forty-three to forty-nine inches annually depending upon the location. A twenty year record at the U.S. Geological Survey gauge at Tarboro, where the drainage area is 2,100 square miles, indicates the average rate of flow in cubic feet per second to be 2,283, the maximum rate of flow to be 37,200, and the minimum to be 36.

The population of the basin was 280,851 based on the 1940 census. The preliminary 1950 census indicates that the population has increased to 299,027.

ECONOMIC DEVELOPMENT

There are nine urban communities in the basin whose population comprises twenty-eight percent of the total. The principal cities are Rocky Mount and Greenville. These and others are trading centers for tobacco and other farm products. Washington, at the head of Pamlico River, is also a distribution center for water-borne commerce and fishing products.

Industry in the area is of relatively little importance. The largest tobacco market in the State, however, is at Rocky Mount which also has the Atlantic Coast Line RAilroad shops. There are several small textile plants, a meat packing plant, and a number of sawmills.

Agriculture is the principal occupation of the people of the basin. The chief crops are tobacco, cotton, corn, peanuts, potatoes, soy beans, and truck produce. A considerable trade is carried on in livestock, particularly in horses and mules.

USE OF WATER RESOURCES

There are twenty public water supplies in the basin serving a total population of 103,470. Eight of these supplies are from surface sources which supply water for 73,700 persons.

Very little has been done in this basin toward the utilization of water resources for recreational purposes, and no areas have been proposed for development. In the Pamlico River near Washington, there is considerable fishing and boating.

The commercial fishing in the lower reaches of the river is quite extensive. This includes herring and shad fishing during the spring spawning season as far up stream as Rocky Mount.

Navigation is provided for by a ten and a half foot channel from the mouth of the river to Washington, and a six foot channel thence to a point eleven miles below Greenville.

There are no hydroelectric developments of any size on the Tar River, and large scale power development seems improbable.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in TAbles A through I, inclusive.

There are nineteen sources of municipal pollution in the Tar River Basin. The sewered population is 65,670 but the amount of pollution discharged to watercourses is reduced 40 percent to a population equivalent of 39,420 by treatment at several municipalities. There is no industrial pollution discharging to streams separate from municipal wastes.

Thirteen municipalities have twenty primary treatment plants serving a population of 16,570. There are two secondary treatment plants serving 26,200 people. Four municipalities with a sewered population of 22,900, provide no sewage treatment.

Of the twenty-two municipal treatment plants, five are satisfactory with regard to design capacity and twenty-two are satisfactory with regard to operation. The design capacity of seventeen is unsatisfactory.

Two municipal treatment plants serving 600 persons were completed during the period 1946-1949. To abate pollution in the basin thirteen new municipal plants will be required to serve 34,150 people. An enlargement to one plant serving 1,200 persons also will be necessary. No project is required at five municipalities having facilities serving 30,320 people.

No formal action has been taken with twelve municipalities, abatement has been ordered at one, and plans to abate pollution are under preparation at another.

TABLE A (6)

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to Water course (In Terms of Equivalent number of People)
Having data on pollution load discharged to watercourse	19	65,670	39,420
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	-	Not applicable
TOTAL	19	65,670	XXX XXX

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

TABLE B (6)

SOURCES OF POLLUTION

INDUSTRIAL*

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharge to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	0	-
Producing Organic Wastes	0	Undetermined
Producing Inorganic Wastes	0	Not Applicable
Producing Wastes of Undetermined Type	0	Undetermined
TOTAL	0	xxx xxx

* No industries having separate outlets and discharging wastes directly to a watercourse are reported.

TABLE C(6)

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number Municipalities*	Plants	Population Served
Primary	13	20	16,570
Secondary	2	2	26,200
No Treatment	4	XXX XXX	22,900

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

TABLE D (6)

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

		Number of Industrial Plants Having:		
Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
(**)	-	-	-	-

* Industries having separate outlets and discharging wastes directly to watercourse.

** No industries having separate outlets and discharging wastes directly to a watercourse are reported.

TABLE E (6)

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to: Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	22	5	17	0	22	0	0
Industrial	* 0	-	-	-	-	-	-

* No industries having separate outlets and discharging wastes directly to watercourse are reported.

TABLE F (6)

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial*	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv.No.People)
1946	0	-	0	-
1947	1	100	0	-
1948	0	-	0	-
1949	1	500	0	-

* No industries having separate outlets and discharging wastes directly to a watercourse are reported.

TABLE G(7)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number	Population Served by Facilities	Number
New Plant	7	80,600	2
Enlargement or Additions to Existing Plant	3	35,700	0
Replace Existing Plant	0	-	0
No Project Required	*30	68,750	0
Undetermined	0	-	0

* Includes Cherry Point Marine Base, for which no population served datum is available.

TABLE G(6)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial*
	Number	Population Served by Facilities	Number
New Plant	13	34,150	0
Enlargement or Additions to Existing Plant	1	1,200	0
Replace Existing Plant	0	-	0
No Project Required	5	30,320	0
Undetermined	0	-	0

* No industries having separate outlets and discharging wastes to a watercourse are reported.

TABLE H (7)

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1,1950

Status of Project	Number	
	Municipal	Industrial
No Formal Action	7	2
Abatement Ordered	3	0
Plans under Preparation	0	0
Final Plans Approved	0	0
Construction Awaiting Financing	0	0
Under Construction	0	0
Status Undetermined	0	0

TABLE H (6)

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number	
	Municipal	Industrial*
No Formal Action	12	0
Abatement Ordered	1	0
Plans under Preparation	1	0
Final Plans Approved	0	0
Construction Awaiting Financing	0	0
Under Construction	0	0
Status Undetermined	0	0

* No industries having separate outlets and discharging wastes directly to a watercourse are reported.

TABLE I (6)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1, 1950

Name	Population Served	Project Requirements	Remarks
Bethel, N.C.	1,200	Enlarge existing plant	
Elm City, N.C.	850	New Plant	
Enfield, N.C.	1,550	New Plant	
Franklinton, N.C.	750	New Plant	
Greenville, N.C.	9,000	New Plant	
Littleton, N.C.	1,000	New Plant	
Louisburg, N.C.	2,000	New Plant	
Nashville, N.C.	1,000	New Plant	
Pinetops, N.C.	1,000	New Plant	
Robersonville, N.C.	1,000	New Plant	
Scotland Neck, N.C.	2,000	New Plant	
Spring Hope, N.C.	1,000	New Plant	Abatement Ordered
Tarboro, N.C.	7,000	New Plant	Plans under Preparation
Washington, N.C.	6,000	New Plant	

SUB-BASIN 7

NEUSE RIVER BASIN

GENERAL DESCRIPTION

The Neuse River BAsin is bounded on the northeast by the Tar River Basin, on the southeast by the Coastal Area, on the southwest by the Cape Fear River BAsin, and on the northwest by the Roanoke River Basin. The river is formed by the confluence of the Eno and Flat Rivers in the eastern Piedmont region of northcentral North Carolina and flows across the Coastal Plain to Pamlico Sound. Its length, including the Flat River, is about 300 miles. The total drainage area of the basin is about 5640 square miles, all of which lies in the State of North Carolina.

The mean annual temperature ranges from sixty-three degrees on the coast to fifty-nine degrees inland. The average annual rainfall varies from approximately thirty-seven inches at Durham, North Carolina to nearly fifty-six inches near the coast. A seventeen year record at the U.S. Geological Survey gauge at Kingston, North Carolina, where the drainage area is 2,690 square miles, shows the average discharge in cubic feet per second to be 2,856, the maximum to be 25,900, and the minimum to be 124.

The population of the basin according to the 1940 census was 466,777. The preliminary 1950 census indicates the population to be 539,858.

ECONOMIC DEVELOPMENT

There are nine and part of a tenth urban communities in the basin whose combined populations comprise thirty-six percent of the total. The largest of these is Durham with a population of 70,307, but which lies half in the Cape Fear River Basin. Raleigh, a city of 65,123, is the State Capitol. Four other cities have populations of between fifteen and twenty-five thousand.

The principal activity of the basin is agriculture. The land is well adapted to growing a variety of crops, chief among which are tobacco, cotton, peanuts, potatoes, corn, and truck produce.

The principal industrial area is at Durham where the chief activities are the manufacture of cigarettes and other tobacco products and textiles.

USE OF WATER RESOURCES

There are thirty-seven public water supplies in the basin serving 216,535 people. Ten of these serving a population of 149,700 are from surface sources.

Other than for public water and livestock water supplies, the principal water use in the basin is for recreation. Many private lakes exist in the upper part of the basin. Two State parks have been developed for outdoor activities including fishing, hunting, boating and camping. These sports are also engaged in many other parts of the basin.

There is considerable commercial fishing in the lower reaches of the river.

The development of large power dams appears to be economically infeasible.

The Neuse is navigable by a twelve foot channel to New Bern, and for twenty-three miles farther by a four foot channel.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in TAbles A through I, inclusive.

There are thirty-nine sources of municipal pollution in the basin. Thirty-seven have a combined sewered population of 184,950 and discharge waste with a population equivalent of 162,145. One municipality with a sewered population of 100 has no data on the pollution load to a watercourse, and population and other data is lacking for one military base. Two industries in the basin produce organic waste with a population equivalent of 7,500.

There are seventeen primary treatment plants at sixteen municipalities serving a population of 14,515. Twelve municipalities have secondary treatment plants, eleven of which serve 58,485 people. Eleven municipalities with a sewered population of 112,050 provide no treatment. Of the two industries depositing organic pollution in watercourses, only one has treatment facilities.

Of the twenty-nine municipal treatment plants, twenty-six are satisfactory with respect to design capacity and three are unsatisfactory. All are satisfactory as to operation. The one industrial waste treatment plant is satisfactory as to design capacity and operation.

Four new municipal treatment plants to serve 2,600 people were constructed in 1949. Seven new plants to serve 80,600 people, and enlargements or additions at three to serve 35,700 people, are required to abate pollution in the basin. Two new industrial waste treatment plants are needed also.

No formal action to abate pollution has been taken with seven municipalities and two industries. Abatement has been ordered at three communities.

TABLE A (7)

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to wate course (In Terms o Equivalent number of People)
Having data on pollution load discharged to watercourse	37	184,950	162,145
Having population data available (Data on pollution load to watercourse incomplete or not available)	1	100	Not Applicable
TOTAL	**39	185,050	X X X X X X

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes one source of pollution, consisting of the Cherry Point Marine Base, for which no population served or pollution discharged figures are available.

TABLE B(7)

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	2	7,500
Producing Organic Wastes	0	Undetermined
Producing Inorganic Wastes	0	Not Applicable
Producing Wastes of Undetermined Type	0	Undetermined
TOTAL	2	xxx xxx

TABLE C (7)

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number		Population Served
	Municipalities*	Plants	
Primary	16	17	14,515
Secondary	**12	**12	58,485
No Treatment	11	XXXX	112,050

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes Cherry Point Marine Base for which population served datum is not given.

TABLE $D_{(7)}$

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

		Number of Industrial Plants Having:		
Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Food and Kindred Products	1	0	1	0
Textile Mill Products	1	1	0	0

* Industries having separate outlets and discharging wastes directly to watercourse.

TABLE E(7)

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to: Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	29	26	3	0	29	0	0
Industrial	1	1	0	0	1	0	0

TABLE F (7)

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv.No.People)
1946	0	-	0	-
1947	0	-	0	-
1948	0	-	0	-
1949	4	2,600	0	-

TABLE I(7)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1, 1950

Name	Population Served	Project Requirements	Remarks
Ayden, N.C.	1,500	New Plant	
Benson, N.C.	1,600	Enlarge Existing Plant	
Clayton, N.C.	1,400	New Plant	
Durham, N.C.	32,000	Enlarge Existing Plant	
New Bern, N.C.	8,500	New Plant	
Raleigh, N.C. (1)	34,000	New Plant	
Raleigh, N.C. (2)	30,000	New Plant	
Selma, N.C.	2,100	Addition to Plant	
Smithfield, N.C.	1,800	New Plant	
Wake Forest, N.C.	3,400	New Plant	
Food & Kindred Products	5,000	One New Plant	
Textile Mill Products	2,500	One New Plant	

SUB-BASIN 8

NORTH CAROLINA-VIRGINIA COAST

GENERAL DESCRIPTION

The North Carolina-Virginia Coastal Area includes a strip of lowlands extending along the Atlantic Coast from the Virginia-Maryland State line southward nearly to Wilmington, North Carolina. It includes the Eastern Shore of Virginia and small areas along the western shore of Chesapeake Bay. It is characterized by coastal plains which lie very little above sea level, swamps, and the numerous sounds and banks of the North Carolina coast. The area is drained by numerous minor coastal streams, but its western margin is broken by the estuaries of the Rappahannock, York, James, Chowan, Roanoke, Tar and Neuse Rivers. The total drainage area of the basin is 5,956 square miles, 4729 of which lie in North Carolina and the remainder in Virginia.

The climate of the area is considerably warmer than is found inland due, largely, to the proximity to the Gulf Stream which is twelve to forty miles off shore depending upon the latitude. The mean annual temperature varies from sixty degrees on the Eastern Shore of Virginia to sixty-two degrees toward the southern end of the area. The average annual rainfall varies from forty-three inches to forty-seven inches.

The population of the basin was 230,789 based on the

1940 census. The preliminary 1950 census indicates that the population has increased to 323,806.

ECONOMIC DEVELOPMENT

There are six urban communities in the basin whose combined population is ten percent of the total. Besides these there are numerous small fishing villages, agricultural centers and summer resorts.

The chief economic activity of the basin has to do with the catching and packing of fish and other sea foods, farming, and the maintenance of summer and winter resorts. Principal crops are truck produce, peanuts, corn, and in some areas tobacco, cotton, and grains. Canneries located on the Eastern Shore of Virginia handle a large part of the truck crops produced in that area.

Shipping is of importance with Beaufort and Morehead City, North Carolina accessable by means of a thirty-foot channel. The Intracoastal Waterway also traverses the entire area.

USE OF WATER RESOURCES

There are fifteen public water supplies in the area serving 53,683 people. All of these supplies are from underground sources.

The principal use of the water resources is their utilization as a means of livelihood. Valuable food fish, oyster and shrimp fisheries are found throughout the entire area. In addition the recreational activities supplied by the coastal waters place high in the economic life of the region. These activities include sport fishing, hunting, boating, and swimming. The area is a summer playground.

The waters of the sounds and coastal streams constitute one of the important overwintering areas of the Atlantic Coast for wild water fowl.

The Intracoastal Waterway, which traverses the entire area, carries a considerable amount of commercial traffic as well as numerous pleasure craft.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in Tables A through I, inclusive.

There are eighteen municipalities in the basin discharging pollution to watercourses. Fourteen of these serve 32,000 people and produce sewage having a population equivalent of 27,755. One serves a population of 15,000 but data concerning the strength of the sewage effluent is lacking. Three others are military establishments for which population figures are not available. Fifteen industries in the basin produce organic waste.

Five* municipalities have seven primary treatment plants which serve more than 4,010 people. Four* municipalities have secondary treatment plants serving a population greater than 19,100. Nine municipalities having a sewered population of 23,890 provide no treatment. Of the industries discharging waste directly to watercourses, two provide treatment, twelve have no treatment facilities, and the facilities of one are undetermined.

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* Two are military establishments for which population served data is not available.

Of the eleven existing municipal treatment facilities, the design capacity of three are satisfactory, three are unsatisfactory, and that of five are undetermined. In regard to operation four are satisfactory and the status of seven is undetermined. The design capacity of one of the industrial waste treatment plants is unsatisfactory and that of the other is undetermined. Operation at one is satisfactory and that of the other is undetermined.

No waste treatment plants were built in the basin during the period 1946-1949.

To abate pollution in the basin six new municipal plants to serve 21,670 people, additions to three plants serving in excess of 4,100 people, and replacement of an existing plant serving 150 persons are needed. Four new industrial waste treatment plants and enlargement of one other are required.

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* One is a military establishment for which population served data is not available.

No formal action to abate pollution has been taken with six municipalities. Construction is awaiting financing at one other. Status of treatment works projects to abate pollution is undetermined for nine municipalities and fifteen industries.

TABLE A (8)

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to Watercourse (In Terms of Equivalent number of People)
Having data on pollution load discharged to watercourse	14	32,000	27,755
Having population data available (Data on pollution load to watercourse incomplete or not available)	1	15,000	Not applicable
TOTAL	**18	47,000	XXX XXX

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes three sources of pollution, U.S. Military Installations, for which no population served or pollution discharged figures are available.

TABLE B(3)

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	0	-
Producing Organic Wastes	15	Undetermined
Producing Inorganic Wastes	0	Not Applicable
Producing Wastes of Undetermined Type	0	Undetermined
TOTAL	0	xxx xxx

TABLE C (8)

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number Municipalities*	Plants	Population Served
Primary	** 5	7	4,010
Secondary	*** 4	4	19,100
No Treatment	9	XXXX	23,890

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes two U.S. Military Installations for which no population served figures are available.

*** Includes one U.S. Military Installation for which no population served figure is available.

TABLE D(8)

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

		Number of Industrial Plants Having:		
Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Food and Kindred Products	10	2	7	1
Chemical and Allied Products	5	0	5	0

* Industries having separate outlets and discharging wastes directly to watercourse.

TABLE E(8)

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to:					
		Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	11	3	3	5	4	0	7
Industrial	2	0	1	1	1	0	1

TABLE F(8)

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv. No. People)
1946	0	-	0	-
1947	0	-	0	-
1948	0	-	0	-
1949	0	-	0	-

TABLE.G(8)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number	Population Served by Facilities	Number
New Plant	6	21,670	4
Enlargement or Additions to Existing Plant	*3	4,100	1
Replace Existing Plant	1	150	0
No Project Required	4	5,280	0
Undetermined	**6	15,800	10

* Includes one U.S. Military Installation for which no population served figure is available.

** Includes two U.S. Military Installations for which no population figures are available. One installation has three separate primary treatment outfalls.

TABLE H(8)

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1,1950

Status of Project	Number Municipal	Industrial
No Formal Action	6	0
Abatement Ordered	0	0
Plans under Preparation	0	0
Final Plans Approved	0	0
Construction Awaiting Financing	1	0
Under Construction	0	0
Status Undetermined	9	15

TABLE I(8)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1, 1950

Name	Population Served	Project Requirements	Remarks
North Carolina Municipalities			
Beaufort	3,270	New Plant	
Camp LeJeune, Marine Base	Not known	Addition to Existing Plant	
Elizabeth City	11,000	New Plant	
Hertford	1,700	New Plant	
Holly Ridge	600	Addition to Existing Plant	
Moorehead City	2,600	New Plant	
Swansboro	400	New Plant	Construction Awaiting Financing
Wrightsville Beach	3,500	Addition to Existing Plant	
Industries			
None			
Virginia Municipalities			
Cape Charles	2,700	New Plant	
Dam Neck, U.S.AAT & TC	Not Known	Three Undetermined	
Little Creek, U.S.N. Amph. Base	Not Known	Undetermined	
Northhampton, Accomac Hosp.	150	Replace Existing Plant	

Name	Population Served	Project Requirements	Remarks
Virginia			
Municipalities			
Onancock	800	Undetermined	
Virginia Beach	15,000	Undetermined	
Industries			
Food & Kindred Products	Not Known	Four New Plants	
Food & Kindred Products	Not Known	Enlarge One Plant	
Food & Kindred Products	Not Known	Five Undetermined	
Chemical and Allied Products	Not Known	Five Undetermined	

SUB-BASIN 9

CAPE FEAR RIVER BASIN

GENERAL DESCRIPTION

The Cape Fear River Basin is bounded on the north by the Roanoke River Basin, on the northeast by the Neuse River Basin, on the east by the Coastal Area and Atlantic Ocean, and on the southwest by the Pee Dee and Yadkin-Pee Dee River Basins.

The Cape Fear River is formed by the confluence of the Haw and Deep Rivers in Chatham County, North Carolina. It flows in a general southeastern direction across the"fall line" of the Piedmont Plateau and Coastal Plain to discharge to the Atlantic Ocean at Cape Fear. Its length from the confluence of the Haw and Deep Rivers to the mouth is about 200 miles. The basin lies entirely within the State of North Carolina and comprises approximately 8,500 square miles.

The largest tributary of the main river is the Northeast Cape Fear River which is 118 miles long and drains 1710 square miles of the Coastal Plain. Other important tributaries are the Haw River with a drainage area of 1760 square miles, and the Deep River with a drainage area of 1390 square miles. The gradient of both of these latter streams is steep, the Haw falling 842 feet in 130 miles and the Deep falling the same amount in 120 miles.

The mean annual temperature at the northwest end of the basin is about fifty-eight degrees. Toward the coast it is sixty-three degrees. The average annual rainfall varies from forty-four inches inland to forty-seven inches near the coast. A twenty-three year record of the U.S. Geological Survey gauge at Lillington, where the watershed area is 3,440 square miles, indicates an average discharge in cubic feet per second of 3,309, a maximum discharge of 192,000, and a minimum regulated discharge of 29.

The population of the basin was 676,388 based on the 1940 census. The preliminary 1950 census gives a population of 805,233.

ECONOMIC DEVELOPMENT

There are twelve urban communities entirely within the basin and three others located partly in it. The urban population residing in the basin constitutes thirty-seven percent of the total. Six of these cities have populations approximately 25,000 or over. Two of these have populations greater than 70,000.

Industrial development in the basin is more or less localized in the Haw and Deep River valleys. Numerous textile mills are located there, especially around Greensboro. High Point, which is partly in the Yadkin-Pee Dee River Basin, has one of the largest concentrations of furniture manufacturing in the United States. The processing of tobacco products is also important in the basin. Wilmington, near the mouth of the Cape Fear River, is the largest port in the State.

The main Cape Fear River valley is preponderantly agricultural. Principal crops are cotton, tobacco, corn, peanuts, soy beans, fruit, berries and truck crops of which cotton is probably the most important. Peaches are an important product of the Sand Hill Region. Fayetteville is a large trading center for agricultural products.

USE OF WATER RESOURCES

There are thirty-six public water supplies in the basin serving a population of 338,145. Seventeen of these are from surface sources and serve 300,560 people.

There are no hydroelectric power developments of large size in the basin, although there are a number of small power dams. In the upper and central part of the basin several reservoirs have been developed as recreational centers.

The largest beach and seaside resorts in the State are found near Wilmington.

Commercial fishing, particularly for shad, herring, and sturgeon, is quite extensively done in the river below Fayetteville.

The river is navigable by a thirty foot channel to Wilmington and further development of port facilities there are planned. An eight foot channel is maintained by a series of three locks to Fayetteville 140 miles above the mouth. The

North Cape Fear River is navigable for 48 miles through a six foot channel. The Black River is navigable for 24 miles by means of a five foot channel.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in Tables A through I, inclusive.

There are forty-three sources of municipal pollution in the basin from a sewered population of 319,845. This pollution is reduced by treatment to a population equivalent of 235,430. Twelve industries discharge organic pollution having a population equivalent of 20,100 directly to streams. Three others, including one of the above mentioned twelve, discharge inorganic waste.

Twenty-one municipalities have twenty-four primary treatment plants serving a population of 28,180. Eleven municipalities have fourteen secondary treatment plants serving a population of 182,070. Fourteen communities, including three also considered with those having primary treatment plants, discharge untreated sewage and have a sewered population of 109,595. Of the industries discharging sewage directly to streams, one has a treatment plant, eleven have no treatment facilities, and two have undetermined facilities.

The design capacity of twenty-eight municipal treatment plants is satisfactory and that at ten is unsatisfactory. The operation of all thirty-eight is satisfactory. The one industrial treatment plant is satisfactory in regard to design capacity and operation.

Four municipal plants were built in 1949 to serve a population of 16,275. Eighteen new municipal plants to serve 115,770 people are needed. Enlargement or additons are needed at six municipalities to serve 106,920 persons. Eight new industrial plants are required.

No formal action to abate pollution has been taken with sixteen municipalities or eleven industries. Final plans have been approved for abatement at two municipalities.

TABLE B (9)

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharg to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	12	20,100
Producing Organic Wastes	0	Undetermined
Producing Inorganic Wastes	*3	Not Applicable
Producing Wastes of Undetermined Type	0	Undetermined
TOTAL	**14	xxx xxx

* One included also under organic wastes.

** Total adjusted to correct for duplication noted in footnote marked, * .

TABLE C (9)

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number Municipalities*	Plants	Population Served
Primary	21	24	28,180
Secondary	11	14	182,070
No Treatment	14	XXXX	109,595

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

TABLE D (9)

EXISTING TREATMENT FACILITIES.

INDUSTRIAL *

		Number of Industrial Plants Having:		
Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Textile Mill Products	11	1	10	0
Chemical and Allied Products	3	0	1	2

* Industries having separate outlets and discharging wastes directly to watercourse.

TABLE E(9)

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to:					
		Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	38	28	10	0	38	0	0
Industrial	1	1	0	0	1	0	0

TABLE F (9)

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes treated (In Terms of Equiv. No. People)
1946	0	-	0	-
1947	0	-	0	-
1948	0	-	0	-
1949	4	16,275	0	-

TABLE G (9)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number	Population Served by Facilities	Number
New Plant	18	115,770	8
Enlargement or Additions to Existing Plant	6	106,920	0
Replace Existing Plant	0	-	0
No Project Required	28	97,155	3
Undetermined	0	-	3

TABLE H(9)

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number	
	Municipal	Industrial
No Formal Action	16	11
Abatement Ordered	0	0
Plans under Preparation	0	0
Final Plans Approved	2	0
Construction Awaiting Financing	0	0
Under Construction	0	0
Status Undetermined	2	0

TABLE I(9)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1,1950

Name	Population Served	Project Requirements	Remarks
Asheboro, N.C.	5,000	New Plant	Final Plans Approved
Burlington, N.C. #1	5,000	New Plant	
Burlington, N.C. #2	9.000	New Plant	
Carthage, N.C.	925	New Plant	
Clinton, N.C.	2,120	New Plant	
Durham, N.C.	15,000	Enlargement of Existing Plant	
Elon College, N.C.	400	New Plant	
Fayetteville, N.C.	34,605	New Plant	
Fuquay Springs,N.C.	1,000	Addition to Existing Plant	
Gibsonville, N.C.	1,000	Addition to Existing Plant	
Graham,N.C.	2,100	New Plant	
Greensboro,N.C.#1	54,000	Enlargement and Addition to Existing Plant	
Greensboro,N.C.#2	30,000	Enlargement and Addition to Existing Plant	
Liberty, N.C.	920	Addition to Existing Plant	
Lillington, N.C.	740	New Plant	
Mt. Olive, N.C.	2,150	New Plant	
Reidsville,N.C.#1	1,500	New Plant	
Reidsville,N.C.#2	5,000	New Plant	
Southern Pines,N.C.	2,500	New Plant	

Page 2. Table I (9)

Name	Population Served	Project Requirement	Remarks
South Port, N.C.	1,630	New Plant	
Wallace, N.C.	600	New Plant	
Warsaw, N.C.	1,000	New Plant	
Wilmington, N.C. #1	22,000	New Plant	Final Plans Approved
Wilmington, N.C. #2	22,000	New Plant	
Textile Mill Products	19,350	Six New Plants	
Textile Mill Products	Not known	Two New Plants	
Chemical and Allied Products	Not known	Three Undetermined	

SUB-BASIN 10

YADKIN-PEE DEE RIVER BASIN

GENERAL DESCRIPTION

The Yadkin-Pee Dee River Basin lies primarily within the State of North Carolina, but a small area of Virginia, drained by the Ararat River, is also included. The total drainage area is approximately 7,270 square miles. The basin is bounded on the northeast by the Roanoke and Cape Fear River Basins, on the south by the Pee Dee River Basin, on the southwest by the Catawba-Wateree River BAsin, and on the northwest by the Kanawha River Sub-basin.

The Yadkin River rises on the eastern slopes of the Blue Ridge Mountains in North Carolina. It flows northeasterly for about 100 miles, and from thence southeasterly to the junction of the Uwharrie River where it becomes the Pee Dee River. That portion of the Pee Dee which extends from this junction 57 miles down stream to the South Carolina State boundary, is considered to lie in the Yadkin-Pee Dee River Basin.

While the river originates in the Mountain Region, the major portion lies in the Piedmont Plateau. Surface characteristics of this region are rolling hills rising from 700 feet in the eastern part to an average elevation of 1,200 feet toward the western limits of the area.

The mean annual temperature of the basin varies from fifty-six degrees at the western end to sixty-one degrees in the south-central portion. The average annual rainfall varies from forty-six to forty-seven inches. A twenty year record of the U.S. Geological Survey gauge at Rockingham, North CArolina, where the drainage area is 6,870 square miles, indicates an average discharge in cubic feet per second of 7,870, a maximum discharge of 270,000, and a regulated minimum of 143.

The population of the basin was 652,874 based on the 1940 census. The preliminary 1950 census gives a population of 723,608.

ECONOMIC DEVELOPMENT

There are sixteen and part of a seventeenth urban communities in the basin. The urban population constitutes thirty-two percent of the total population. One of these cities, Winston-Salem, has a population of approximately 86,816. Eight others have populations in excess of 10,000.

The Yadkin-Pee Dee Basin is one of the most highly industrialized sections of North Carolina. Principal industries are the manufacturing or processing of textiles, tobacco products, furniture, lumber, aluminum, fertilizer, food products, and include printing, foundaries, tanneries and a small paper board mill. The great textile industry of the State is centered here and in the Catawba-Santee Basin just to the west of it.

The soils of the basin are adapted to the growing of a wide variety of crops. Chief among these are tobacco, cotton and corn. In the Sand Hill region peaches and other fruits form the principal products.

USE OF WATER RESOURCES

There are forty-five public water supplies in the basin serving a total of 273,730 persons. Twenty-eight supplies (including some using both surface and underground water) are taken from surface sources.

Hydroelcetric developments on the river are numerous. Twelve of these, all privately owned and having a combined capacity of 302,815 HP, are already in existence. The U.S. Army Engineers have proposed eight additional major projects correlated with flood control.

Although there is abundant opportunity for recreational development, especially on the lakes formed by hydroelectric dams, only a beginning has been made towards this end. Some swimming, boating, and bathing is done. Game fish are found in the mountain streams of the headwaters.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in Tables A through I, inclusive.

There are forty-eight municipalities in the basin having a sewered population of 228,248. Forty-seven, with a sewered population of 226,948, discharge waste with a population equivalent of 440,506. Eight industries producing organic waste discharge directly to watercourses a population equivalent of 103,560.

Twenty-one municipalities have primary treatment plants which serve a population of 113,852. Sixteen municipalities have twenty secondary treatment plants serving 66,750 people. Twelve communities, including one also having a primary plant for part of its sewage, with 47,646 people discharge pollution without treatment. Of the eight industries, it is known that one provides treatment.

Of forty-one municipal treatment plants, the design capacity of twenty-four is satisfactory, that of thirteen is unsatisfactory, and that of four is undetermined. The operation of thirty-one is satisfactory, that of seven is unsatisfactory, and that of three is undetermined.

Seven municipal waste treatment plants with a combined design population of 17,550 were constructed during the period 1946-1949. Twenty-one new plants to serve 92,221 people and enlargements or additions to six plants serving a population of 85,527 are required to abate pollution in the basin. The requirements of eight industries and five municipalities are undetermined.

No formal action has been taken with twenty-two municipalities and eight industries to abate pollution. Final plans have been approved at two municipalities. Construction is awaiting financing at two others.

TABLE A(10)

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to Watercourse (In Terms of Equivalent number of People)
Having data on pollution load discharged to watercourse	47	226,948	440,506
Having population data available (Data on pollution load to watercourse incomplete or not available)	1	1,300	Not applicable
TOTAL	48	228,248	X X X X X X

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

TABLE $B_{(10)}$

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	8	103,560
Producing Organic Wastes	0	Undetermined
Producing Inorganic Wastes	0	Not Applicable
Producing Wastes of Undetermined Type	0	Undetermined
TOTAL	8	xxx xxx

TABLE $C_{(10)}$

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number Municipalities*	Plants	Population Served
Primary	21	21	113,852
Secondary	16	20	66,750
No Treatment	12	X X X	47,646

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

TABLE $D_{(10)}$

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

		Number of Industrial Plants Having:		
Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Textile Mill Products	8	0	1	7

* Industries having separate outlets and discharging wastes directly to watercourse.

TABLE E (10)

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to: Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	41	24	13	4	31	7	3
Industrial	0	-	-	-	-	-	-

TABLE $F_{(10)}$

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv. No. People)
1946	0	-	0	-
1947	2	3,500	0	-
1948	0	-	0	-
1949	5	14,050	0	-

TABLE G (10)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number	Population Served by Facilities	Number
New Plant	21	92,221	0
Enlargement or Additions to Existing Plant	6	85,527	0
Replace Existing Plant	0	-	0
No Project Required	22	43,625	0
Undetermined	5	6,875	8

TABLE H (10)

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number	
	Municipal	Industrial
No Formal Action	22	8
Abatement Ordered	0	0
Plans under Preparation	0	0
Final Plans Approved	2	0
Construction Awaiting Financing	2	0
Under Construction	0	0
Status Undetermined	0	0

TABLE I(10)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1, 1950

Name	Population Served	Project Requirements	Remarks
Badin, N.C.	3,100	Addition to Plant	
Concord, N.C.	19,000	New Plants	Construction Awaiting Financing
Denton, N.C.	677	Addition to Plant	
Elkin, N.C.	2,300	New Plant	
Hamlet, N.C.	4,125	New Plant	
Huntersville, N.C.	500	New Plant	
Jonesville, N.C.	196	New Plant	
Kanapolis, N.C.	5,000	New Plant	
Lexington, N.C.	12,500	New Plants	
Linesville, N.C.	500	Enlargement of Existing Plant	
Moorsville, N.C.	6,200	New Plant	Construction Awaiting Financing
Morven, N.C.	250	Addition to Plant	
Mr. Airy, N.C.	6,000	New Plant	
N.C. Dyeing & Finishing Company	1,000	Undetermined	
N. Wilkesboro, N.C.	3,500	New Plant	
Norwood, N.C.	1,300	Undetermined	
Pilot Mountain, N.C.	900	New Plant	
Rockingham, N.C.	3,600	New Plant	
Rural Hall Sanitary District, N.C.	1,000	Addition to Plant	
Salisbury, N.C.	15,000	New Plant	Final Plans Approved

Page 2. Table I (10)

Name	Population Served	Project Requirements	Remarks
Spencer, N.C.	3,000	New Plant	Final Plans Approved
Star, N.C.	500	New Plant	
Thomasville, N.C.	7,500	New Plant	
Troy, N.C.	1,400	New Plant	
Wilkesboro, N.C.	900	New Plant	
Winston Salem, N.C.	80,000	Addition to Plant	
Textile Mill Products	103,560	Eight Undetermined	

SUB-BASIN 11

PEE DEE RIVER BASIN

GENERAL DESCRIPTION

The Pee Dee River Basin is bounded on the northeast by the Cape Fear River Basin, on the southeast by the Atlantic Ocean, on the southwest by the Santee-Cooper and Catawba-Wateree River Basins, and on the northwest by the Yadkin-Pee Dee River Basin. The river flows in a southeasterly direction to empty into Winyah Bay on the South Carolina coast. The basin comprises 10,400 square miles, 7,735 of which lie in South Carolina and the remainder in North Carolina.

The basin is made up mostly of relatively level land. Gradients are moderate and most streams are comparatively free from silt.

The mean annual rainfall varies from forty-three to forty-eight inches. A nine year record of the U.S. Geological Survey gauge near Mars Bluff, South Carolina, where the watershed area is 8,870 square miles, shows a maximum discharge of 220,000 cubic feet per second and a minimum flow of 900 cubic feet per second, both of which are partially regulated.

The climate of the area is mild. Rainfall is well distributed throughout the year and floods are rare. The mean annual temperature varies from sixty-one to sixty-four degrees.

The population of the basin was 634,806 based on the 1940 census. The preliminary 1950 census indicates a population of 691,225.

ECONOMIC DEVELOPMENT

There are twenty-one urban communities in the basin having a combined population of 137,170, or twenty percent of the total. Eighteen of these communities lie in South Carolina. The largest is Florence, South Carolina which has a population of 22,378.

Industrial operations are not extensive. The principal industry is the manufacture of paper pulp and paper products, with the largest plants being located on the coast. Textile plants are located in the central and northern portions of the basin.

Agriculture is the principal economic activity of the basin. The chief crop is tobacco. Considerable cotton is also grown. Other crops include corn, truck produce, strawberries and melons.

USE OF WATER RESOURCES

There are fifty-nine public water supplies in the basin serving 179,340 people. Eight of these are from surface supplies and serve a population of 26,050.

Recreational activities are largely confined to hunting and fishing in the interior portions, with extensive commercial development of beach areas on the coast. Fish are plentiful resulting in some commercial operations in coastal waters.

No hydroelectric developments are in operation in the area because of the generally unsuitable terrain.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in Tables A through I, inclusive.

There are forty-nine sewered municipalities in the basin serving 121,647 people. The pollution from these municipalities is reduced by treatment at some to a population equivalent of 94,277. Six industries release organic waste having a population equivalent of 507,700 directly to watercourses. Three others produce organic waste of unknown strength. Two additional ones produce wastes of undetermined type.

Twenty-nine municipalities have thirty-two primary treatment plants serving a population of 51,370. Eight communities have nine secondary treatment plants serving a population of 35,900. Thirteen communities, including one also having primary treatment for a part of its sewage, serving a population of 34,377 provide no treatment. Three industries out of eight provide for waste treatment.

Of forty-one municipal treatment plants, twenty-five have satisfactory capacities and thirty-one are satisfactory with respect to operation. Two of the industrial waste treatment plants are satisfactory in operation but unsatisfactory in capacity. The status of the third industrial plant is undetermined.

Four municipal sewage treatment plants designed to serve a population of 23,000, and one industrial plant capable of reducing waste up to 18,000 population equivalent were constructed during the period 1946-1949.

Requirements to abate pollution in the basin are thirteen new municipal plants to serve a population of 46,040, and four new industrial treatment plants, additions to nine municipal plants serving 9,750 people and to three industrial waste treatment plants, and replacement of one municipal plant serving 1,500 persons.

No formal action to abate pollution has been taken with sixteen municipalities and six industries. Abatement has been ordered at two municipalities. Plans are under preparation at three others, and final plans have been approved at one more. One municipal and one industrial waste treatment plant are under construction.

TABLE A(11)

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to water course (In Terms of Equivalent number of People)
Having data on pollution load discharged to watercourse	49	121,647	94,277
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	-	Not applicable
TOTAL	49	121,647	XXX XXX

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

TABLE B (11)

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	3	507,700
Producing Organic Wastes	3	Undetermined
Producing Inorganic Wastes	0	Not Applicable
Producing Wastes of Undetermined Type	2	Undetermined
TOTAL	8	xxx xxx

TABLE C (11)

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number		Population Served
	Municipalities*	Plants	
Primary	29	32	51,370
Secondary	8	9	35,900
No Treatment	**13	XXXX	34,377

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** One municipality also included in primary treatment.

TABLE D(11)

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

		Number of Industrial Plants Having:		
Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Textile Mill Products	2	1	1	0
Paper & Allied Products	3	2	1	0
Chemical & Allied Products	2	0	2	0
Miscellaneous	1	0	1	0

* Industries having separate outlets and discharging wastes directly to watercourse.

TABLE E (11)

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to: Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	41	25	16	0	31	10	0
Industrial	3	0	2	1	2	0	1

TABLE $F_{(11)}$

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes treated (In Terms of Equiv. No. People)
1946	0	-	0	-
1947	1	1,000	0	-
1948	2	10,000	1	18,000
1949	1	12,000	0	-

TABLE G(11)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number*	Population Served by Facilities	Number
New Plant	13	46,040	4
Enlargement or Additions to Existing Plant	9	9,750	3
Replace Existing Plant	1	1,500	0
No Project Required	30	62,557	0
Undetermined	1	1,800	1

* - Number includes five municipalities in two requirement classifications.

TABLE H (11)

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number	
	Municipal	Industrial
No Formal Action	16	6
Abatement Ordered	2	0
Plans under Preparation	3	0
Final Plans Approved	1	0
Construction Awaiting Financing	0	0
Under Construction	1	1
Status Undetermined	0	1

TABLE I (11)

PROJECT LIST * MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1,1950

Name	Population Served	Project Requirements	Remarks
North Carolina Municipalities			
Gibson	200	Addition to Plant	
Raeford	1,000	New Plant	
Red Springs	500	New Plant	
South Carolina Municipalities			
Bennettsville	4,300	Addition to Plant	
Bishopville	2,300	New Plant	Final Plans Approved
Chesterfield	1,500	Replace Existing Plant	
Clio	700	Addition to Plant	
Conway	3,000	New Plant	Plans under Preparation
Dillon	3,000	New Plant	
Florence	12,000	New Plant	Plans under Preparation
Florence Air Base	2,000	New Plant	Plans under Preparation
Georgetown	6,500	New Plant	
Hemingway	850	Addition to Plant	
Lamar	540	New Plant	

Name	Population Served	Project Requirements	Remarks
Manning #1	200	Addition to Plant	Abatement Ordered
Manning #2	1,000	New Plant	Abatement Ordered
Marion	2,000	New Plant	
McColl	1,200	Addition to Plant	
Mullins	4,200	New Plant	
Pageland	800	Additions to Two Plants	
Sumter	8,000	New Plant	Under Construction
Timmonsville	1,500	Addition to Plant	
Industries			
Textile Mill Products	10,000	Addition to One Plant	
Textile Mill Products	Not Known	One New Plant	Under Construction
Paper & Allied Products	497,700	Additions to Two Plants	
Paper & Allied Products	Not Known	One New Plant	
Chemical & Allied Products	Not Known	One New Plant	
Chemical & Allied Products	Not Known	One Undetermined	
Miscellaneous	Not Known	One New Plant	

SUB-BASIN 12

CATAWBA-WATEREE RIVER BASIN

GENERAL DESCRIPTION

The Catawba-Wateree Basin is bounded on the northeast by the Yadkin and Pee Dee Basins, on the southeast by the Santee Basin, on the southwest by the Congaree Basin, and on the northwest by the Tennessee River Basin. The basin comprises an area of about 5,580 square miles, of which 3,250 are in North Carolina and 2,330 in South Carolina. The Catawba River rises on the eastern slope of the Blue Ridge mountains in North Carolina and flows first in an easterly direction for about eighty miles, then turns abruptly and flows almost due south, entering South Carolina, for about 215 miles to its junction with the Congaree River near Columbia, South Carolina. About midway of its South Carolina portion the name changes to Wateree River (at Wateree Pond).

The elevation of the headwaters at Lake James, 150 miles from the North Carolina-South Carolina State line is 1200 feet; while at the State line the elevation is 510 ft., giving an average slope of 4.6 per mile. The Catawba River, rising in the mountain region and flowing through the Piedmont Plateau causes extensive erosion with resultant muddy water in the mainstem and most tributaries.

The mean annual temperature varies from about fifty degrees in the northern part of the basin to sixty-three degrees in the southern portion. Rainfalls are rather well distributed throughout the year and occasional floods are local in character. The average rainfall varies from forty-six to fifty inches throughout the basin. An eighteen year record of the U.S. Geological Survey gauge on the Wateree River near Camden, South Carolina, shows the average discharge to be 5,775 cubic feet per second. River flows are regulated by power developments on the stream and the minimum reported flow was 170 cubic feet per second. The 1940 population of the basin was 560,538. Preliminary reports of the 1950 census indicate a total population of 668,980, of which seventy-seven percent is in North Carolina.

ECONOMIC DEVELOPMENT

There are twenty urban communities in the basin, having a population of 276,393, representing forty-one percent of the total basin population. Of the twenty, thirteen are in North Carolina and seven in South Carolina. The largest concentrations of population are in towns located on the mainstem of the river. The Catawba-Wateree River basin is located in the heavily industrialized region of the Carolinas. Industrial distribution is similar to population distribution, the largest concentrations being in towns located on the main river. The principal industry is in all branches of textile work, including two large synthetic fiber plants. Smaller towns scattered throughout the basin have a considerable number of textile plants, generally devoted to spinning and weaving. This basin is a part of what may be termed the center of marked industrial development of the south, a development in which hydroelectric power of the Santee River system and its tributaries, has played a leading part. The numerous cotton mills of the basin constitute a large part of those in the two Carolinas and a considerable percent of spindal installations in the United States. Other industries have taken advantage of the ample supply of dependable power, excellent transportation facilities and available labor, but the preponderent activity in the basin is the production of textiles.

Agriculture is extensively practiced throughout the basin: in the mountain region where the soils have been cleared, a large amount of corn, hay, potatoes, fruit and small grain is produced. In the Piedmont section of the basin the soil texture ranges from sandy loams to clay loams and clay which produce a great range of agriculture products including clover, forage and hay crops in the clay loams, tobacco in the sandy loam while cotton and corn are grown extensively in the heavier clay soils. Cotton is the principal agricultural product, this being one of the best regions in the south for its cultivation. Dairying is a growing industry due to favorable conditions for raising hay and forage. Lumbering is carried on to some degree in all portions of the basin.

USE OF WATER RESOURCES

There are forty public water supplies in the basin of which twenty-four are obtained from surface waters, representing ninety-three percent of the population served by public supplies. Several of these are taken from the mainstem of the Catawba River.

Waters of the basin are extensively used for recreation, principally fishing, with considerable boating, swimming and hunting. The most intensive use for these purposes is found on the impounded reservoirs. Fish are relatively abundant and migratory waterfowl including duck and geese appear in significant numbers.

The hydroelectric resources of the basin, both in North Carolina and South Carolina have been extensively developed. Developments in the two states consist of seventeen impoundments.

The rivers and streams of the Catawba-Wateree basin are not navigable except for small pleasure craft and these only on lakes formed by the power dams.

POLLUTION AND POLLUTION CONTROL

Available data regarding the sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in Tables A through I, inclusive.

There are forty-five municipal sources of pollution in the basin having a total connected sewered population of 190,945. Forty-one of these with a sewered population of 184,645 discharge a population equivalent of 166,713 to watercourses of the basin. The amount of pollution discharged by four municipalities having a population of 6,300 is unknown. Of the thirty industrial establishments in the basin discharging wastes directly to a watercourse, twenty-three producing organic wastes discharge pollution amounting to a population equivalent of 125,025. The amount of pollution discharged by six industries producing organic wastes and the type and amount produced by one industry is undetermined.

Existing municipal treatment facilities consist of thirty-six primary treatment plants serving 41,455 persons at twenty-one municipalities and nineteen secondary treatment plants serving 101,340 persons at seventeen municipalities. The sewage from 48,150 persons at nine municipalities receives no treatment. One industry in the basin has treatment facilities for its wastes and the remaining twenty-nine do not provide treatment.

The adequacy with relation to capacity and operation of the one industrial waste treatment plant in the basin is undetermined. The capacity of thirty-two of the municipal sewage treatment plants in the basin is satisfactory and the remaining twenty-three is unsatisfactory. Operation of all municipal treatment plants is considered to be satisfactory.

During the period 1946 through 1949, eleven projects to abate pollution in the basin were completed. These projects included ten new plants, having a designed population of 13,900 and one plant enlarged to a designed population of 8,000. No industrial waste treatment plants were constructed during the period.

Requirements for municipal and industrial waste treatment plants to abate pollution in the basin consist of ten new municipal plants to serve a population of 43,000 and three industrial waste treatment plants, enlargement or additions to twelve municipal plants to serve 78,340 and replacement of one existing municipal plant serving a population of 1,800. No project is required at twenty-nine municipalities with a sewered population of 50,905 or at five industrial establishments. The requirements at ten municipalities having a population of 16,900 and twenty-two industrial establishments remains undetermined.

Two municipal treatment plants are under construction, final plans for one have been approved and plans are under preparation at two municipalities. No formal action has been taken with eight municipalities or twenty-five industrial establishments requiring projects to abate pollution in the basin.

TABLE A$_{(12)}$

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to Watercourse (In Terms of Equivalent number of People)
Having data on pollution load discharged to watercourse	41	184,645	166,713
Having population data available (Data on pollution load to watercourse incomplete or not available)	4	6,300	Not applicable
TOTAL	45	190,945	XXX XXX

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

TABLE B (12)

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	23	125,025
Producing Organic Wastes	6	Undetermined
Producing Inorganic Wastes	0	Not Applicable
Producing Wastes of Undetermined Type	1	Undetermined
TOTAL	30	xxx xxx

TABLE $C_{(12)}$

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number		Population Served
	Municipalities*	Plants	
Primary	21	36	41,455
Secondary	17	19	101,340
No Treatment	**9	XXXX	48,150

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Two municipalities also included in primary treatment.

TABLE D(12)

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

		Number of Industrial Plants Having:		
Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Textile Mill Products	22	1	21	0
Paper & Allied Products	3	0	3	0
Miscellaneous	5	0	5	0

* Industries having separate outlets and discharging wastes directly to watercourse.

TABLE E (12)

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to: Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	55	32	23	0	55	0	0
Industrial	1	0	0	1	0	0	0

TABLE F (12)

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv. No. People)
1946	0	-	0	-
1947	1	2,000	0	-
1948	4	9,500	0	-
1949	6	* 10,200	0	-

* Includes enlargement of one treatment plant to a design population of 8,000.

TABLE G(12)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number *	Population Served by Facilities	Number
New Plant	10	43,000	3
Enlargement or Additions to Existing Plant	12	78,340	0
Replace Existing Plant	1	1,800	0
No Project Required	29	50,905	5
Undetermined	10	16,900	22

* Number includes twelve municipalities in multiple requirement classification.

TABLE $H_{(12)}$

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number Municipal	Industrial
No Formal Action	18	25
Abatement Ordered	0	0
Plans under Preparation	2	0
Final Plans Approved	1	0
Construction Awaiting Financing	0	0
Under Construction	2	0
Status Undetermined	0	0

TABLE I(12)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1, 1950

Name	Population Served	Project Requirements	Remarks
North Carolina Municipalities			
Bessemer City	2,500	New Plant	
Charlotte	40,000	Additions to Two Plants	Under Construction
Gastonia	26,000	Addition to Plant	
Hickory	1,800	Replace Existing Plant	Plans under Preparation
Marion	1,800	Enlarge Existing Plant	Plans under Preparation
Morganton #1	4,500	New Plant	Final Plans Approved
Morganton #2	2,000	Addition to Plant	Final Plans Approved
State Insane Hospital	3,000	Addition to Plant	
State School for Deaf	450	Addition to Plant	
Newton	1,000	Addition to Plant	
Pineville	1,200	Addition to Plant	
Taylorsville	690	Enlarge Existing Plant	
Industries			
Textile Mill Products	Not Known	Seventeen Undetermined	
Paper & Allied Products	Not Known	One Undetermined	

Name	Population Served	Project Requirements	Remarks
Miscellaneous	Not Known	Four Undetermined	
South Carolina Municipalities			
Camden	400	New Plant	
Clover #1	600	New Plant	
Clover #2	1,500	New Plant	
Clover #3	500	New Plant	
Fort Mill #1	2,000	Addition to Plant	
Fort Mill #2	2,000	Addition to Plant	
Great Falls	500	New Plant	
Lancaster	6,000	New Plant	
Rockhill	18,500	New Plant	
York	3,500	New Plant	
Industries			
Textile Mill Products	106,300	Three New Plants	

CONGAREE RIVER BASIN

SUB-BASIN 13

GENERAL DESCRIPTION

The Congaree River Basin is bounded on the north and northeast by the Catawba-Wateree River Basin, on the southeast by the Santee River Basin, on the south by the Edisto-Combahee River Basin, on the southwest by the Savannah River Basin, and on the west by the Tennessee River Basin. The Congaree River proper is very short, extending only about 35 miles from the junction of its main tributaries, the Saluda and Broad Rivers, to its confluence with the Catawba-Wateree River to form the Santee River. The total area of the basin is approximately 8,386 square miles of which 6,936 are in South Carolina and 1,450 are in North Carolina.

The Broad River rises on the eastern slope of the Blue Ridge mountains in North Carolina, and flows in a general southeasterly direction to its junction with the Saluda River near Columbia South Carolina. The Saluda River rises in South Carolina near the North Carolina State line.

The topography in the northern portion of the basin is very hilly, while the Congaree proper begins at the fall line and proceeds through relatively flat country. The Broad River, where it rises in North Carolina, has an elevation of 4,000 ft. At the headquarters of Lake Lure, it has an elevation of 1,000 ft., and fifty-one miles below where it crosses into South Carolina the elevation is about 580 feet, making the average slope of the river 8.2 feet per mile in North Carolina. The fall is concentrated, however, at numerous shoals and rapids. Waters in South Carolina are generally very muddy due to erosion--which is most severe in the upstream portions.

Climate is generally mild with average annual temperature decreasing from about sixty-two degrees in the southern part of the basin to fifty-six degrees in the extreme upper part.

Mean annual precipitation varies from about forty-six inches in the southeast central part of the basin to fifty-seven inches in the northwest corner. Rainfall is fairly evenly distributed throughout the year; floods are infrequent and generally of local character.

The 1940 population of the basin was about 758,876, of which 70% was rural. The preliminary 1950 census indicates the basin population to be 850,134.

ECONOMIC DEVELOPMENT

There are twenty-three and part of a twenty-fourth urban communities in the basin having a combined population of about 297,878 according to the 1950 preliminary census. This urban population represents thirty-five percent of the total basin population. Population is rather uniformily distributed down to the junction of the Broad and Saluda Rivers. Columbia, the Capitol of South Carolina, is located at this junction.

Agriculture is practiced extensively throughout the basin. Crops are considerably diversified and highly productive. The area produces significant quantities of cotton, corn, grain and pasturage. Tobacco is grown in the North Carolina part of the basin. Dairying is a growing industry due to favorable conditions for raising hay and forage and the area also produces a very high yield of peaches and some other fruits.

Industry is well distributed through the entire area with the heaviest concentrations in the far up-stream portions of the basin. The Congaree River basin is, in general, located in what may be termed the industrial region of the Carolinas. The principal industry is textile, with plants covering the entire field from spinning and weaving to finishing, dyeing, printing and garment manufacture. Plants are most highly concentrated in the larger cities, but are also found in many smaller towns throughout the basin.

USE OF WATER RESOURCES

There are seventy-one public water supplies in the basin serving a population of 488,865. Thirty-six of these serving 436,250 are from surface supplies.

General recreation, hunting and fishing, and power development are closely connected in this basin. The impounded waters of the several hydroelectric developments in the area are extensively used for these purposes and various smaller streams are extensively fished. Swimming is hampered in many streams by high turbidity and a few streams are so highly polluted as to make them unfit for all recreational purposes.

Commercial navigation is confined to the Congaree River proper and is very light at present. Numerous small pleasure craft are used on lakes formed by power dams.

The hydroelectric resources of the river, both in North and South Carolina has been extensively developed almost entirely by private power companies.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution existing treatment facilities and treatment plant requirements are shown in Tables A through I, inclusive.

There are seventy-four sources of municipal pollution in the basin. Seventy-three have a combined sewered population of 361,390 and discharge waste with a population equivalent of 250,945. Population served and pollution discharged data is not available for one military installation.

Thirty-three industries in the basin produce organic wastes having a population equivalent of 262,164. The amount of pollution discharged by three industries producing organic wastes is undetermined. Two industries in the basin produce inorganic wastes.

Thirty-eight municipalities having a combined population of 95,540 treat their sewage at fifty-eight primary treatment plants. There are twenty-one secondary treatment plants at nineteen municipalities serving a population of more than 155,380. Nineteen municipalities (including one municipality also listed under secondary treatment) having a combined sewered population of 110,470 provide no treatment. Of the thirty-eight industries discharging pollution directly to watercourses of the basin, sixteen have waste treatment facilities.

The adequacy with relation to capacity and operation of treatment facilities at one military installation is undetermined. Of the seventy-eight municipal treatment plants, twenty-nine are satisfactory with respect to design capacity and forty-nine are unsatisfactory. Sixty-five are satisfactory and thirteen are unsatisfactory with respect to adequacy of operation. Adequacy with relation to capacity of eight industrial waste treatment plants is satisfactory, seven are unsatisfactory and that of one remains undetermined. Of the sixteen industrial waste treatment plants eleven are satisfactory with respect to design capacity, four are unsatisfactory and one is undetermined. Nine new municipal treatment plants to serve 67,150 people were constructed during the period 1946 through 1949. Six industrial waste treatment plants to treat wastes having a population equivalent of 11,600 were constructed during this same period.

Forty-one new municipal treatment plants to serve a total population of 137,570 and seventeen new industrial waste treatment plants are required to abate pollution in the basin.

Additions or enlargements to fifteen municipal treatment plants serving a population of 99,425 and additions or enlargements to four industrial waste treatment plants are required. Replacement of one existing plant treating sewage from 900 people is necessary and projects at one municipality and two industries are undetermined. No project is required at fifteen industrial establishments or at thirty-four municipalities having a combined population of 123,495.

No formal action to abate pollution has been taken with forty-two municipalities or twenty-two industries. Four municipal treatment plants are under construction, plans are under preparation at eight municipalities and abatement has been ordered at three, while the status at one remains undetermined. The status of one industrial waste treatment project is also undetermined.

TABLE A (13)

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to Watercourse (In Terms of Equivalent number of People)
Having data on pollution load discharged to watercourse	73	361,390	250,945
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	-	Not Applicable
TOTAL	** 74	361,390	XXX XXX

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes one U.S. Military Installation on an inactive status for which no population served or pollution discharged figures are available.

TABLE B(13)

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	33	262,164
Producing Organic Wastes	3	Undetermined
Producing Inorganic Wastes	2	Not Applicable
Producing Wastes of Undetermined Type	0	Undetermined
TOTAL	38	xxx xxx

TABLE $C_{(13)}$

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number Municipalities*	Plants	Population Served
Primary	38	58	95,540
Secondary	*** 19	21	155,380
No Treatment	** 19	XXXX	110,470

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes one municipality also listed under secondary treatment.

*** Includes one municipality also listed under primary treatment and one U.S. Military Installation on an inactive status for which no population served figure is available.

TABLE D (13)

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

		Number of Industrial Plants Having:		
Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Food & Kindred Products	4	2	2	0
Textile Mill Products	31	14	17	0
Chemical and Allied Products	1	0	1	0
Miscellaneous	2	0	2	0

* Industries having separate outlets and discharging wastes directly to watercourse.

TABLE E (13)

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to: Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	* 79	29	49	1	65	13	1
Industrial	16	8	7	1	11	4	1

* Includes one U.S. Military Installation on an inactive status for which the adequacy with relation to capacity and operation of treatment facilities is undetermined.

TABLE F (13)

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv. No. People)
1946	0	-	0	-
1947	4	15,400	2	3,600
1948	1	250	1	3,000
1949	4	21,500	3	5,000

TABLE G (13)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number	Population Served by Facilities	Number
New Plant	41	137,570	17
Enlargement or Additions to Existing Plant	*15	99,425	4
Replace Existing Plant	1	900	0
No Project Required	** 34	123,495	15
Undetermined	*** 1	Not Known	2

* Includes one municipality with five primary treatment plants and one municipality with two primary treatment plants.

** Includes one municipality having two secondary treatment plants.

*** U. S. Military Installation on an inactive status for which no population served figure is available and requirement for waste treatment plant is undetermined.

TABLE H (13)

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number	
	Municipal	Industrial
No Formal Action	42	22
Abatement Ordered	3	0
Plans under Preparation	8	0
Final Plans Approved	0	0
Construction Awaiting Financing	0	0
Under Construction	4	0
Status Undetermined	1	1

TABLE I(13)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1, 1950

Name	Population served	Project Requirements	Remarks
North Carolina Municipalities			
Alexander Mills*	700	Addition to Plant	
Forrest City	4,800	Addition to Plants	
Industries			
Textile Mill Products	Not Known	One New Plant	
South Carolina Municipalities			
Batesburg	2,000	New Plant	
Belton	900	Replace Existing Plant	Under Construction
Blacksburg	1,200	Two New Plants	
High School	800	New Plant	
Cayce	3,600	New Plant	
Columbia	70,160	New Plant	
Chesnee Mill Village	600	New Plant	
Clinton #1	5,600	New Plant	Under Construction
Clinton #2	1,750	New Plant	
State Training School	1,800	Addition to Plant	

* Domestic Sewage

Name	Population Served	Project Requirements	Remarks
Conestee	700	New Plant	
Cowpens	240	New Plant	
Easley #1	400	Addition to Plant	Plans under Preparation
Easley #2	3,500	Enlarge Plant	Plans under Preparation
Eau Claire	2,500	Enlarge Plant	
Enoree	1,000	New Plant	
Fingerville	250	New Plant	
Fountain Inn	1,250	Two New Plants	
Gaffney #1	2,500	New Plant	Abatement Ordered
Gaffney #2	3,100	Addition to Two Plants	Abatement Ordered
Greer #1	1,000	New Plant	Plans under Preparation
Greer #2	2,400	Addition to Two Plants	Plans under Preparation
Greenville	50,000	Enlarge Plant	Plans under Preparation
Air Base	Not Known	Undetermined	
Inman	1,000	New Plant	
Jonesville	1,300	New Plant	
Landrum	1,500	New Plant	
Laurens	9,000	Enlarge Plant	
Leesville	850	New Plant	
Lexington	1,200	New Plant	
Lockhart	1,600	New Plant	
Lyman	2,000	New Plant	
Mayo	145	New Plant	

Name	Population Served	Project Requirements	Remarks
Olympia Mill Village	3,000	New Plant	
Pelzer	2,750	New Plant	
Piedmont	3,500	New Plant	
Red Banks Mill Village	125	New Plant	
Saluda	1,225	Addition to Two Plants	
Simpsonville	1,850	Two New Plants	
Slater	1,000	New Plant	
Spartanburg	20,000	Addition to Plant	
Union	9,000	Two New Plants	Plans under Preparation
Ware Shoals	4,000	Two New Plants	
West Columbia	2,000	New Plant	
Whitmire	3,100	New Plant	
Winnsboro	2,000	New Plant	
Woodruff	3,000	Two New Plants	Under Construction
Industries			
Food & Kindred Products	Not Known	Addition to One Plant	
Food & Kindred Products	285	Two Undetermined	
Textile Mill Products	236,525	Fourteen New Plants	
Textile Mill Products	5,610	Addition to Three Plants	
Chemical & Allied Products	Not Known	One New Plant	
Miscellaneous	Not Known	One New Plant	

SUB-BASIN 14

SANTEE RIVER BASIN

GENERAL DESCRIPTION

The Santee River Basin is located in the south-central portion of South Carolina. It is bounded on the northeast by the Pee Dee River Basin, on the southeast by the Atlantic Ocean and on the southwest by the Edisto-Combahee River Basin. The area comprises about 3,230 square miles and includes the drainage of the Santee and Cooper Rivers, and several smaller coastal streams.

The Santee River is formed by the junction of the Congaree and Wateree Rivers at the headwaters of Lake Marion, of the Santee-Cooper hydroelectric development. Overflow from Lake Marion is divided, part going to the original course of the Santee River and the remainder going through a diversion canal to Lake Moultrie and thence to the Cooper River which discharges into Charleston harbor.

The area is characterized by relatively wide and shallow river valleys of gentle slope that are generally in a marshy condition. Large areas of tidal flats exist along the Atlantic Ocean boundary of the basin.

Climate of the basin is uniformly warm, with mild winters. Heavy frosts are infrequent. Mean annual temperatures vary from about sixty-three to sixty-six degrees. Rainfall is well distributed throughout the year and floods are rare. Average annual rainfall varies from forty-five to forty-nine inches in the basin. Discharge of the two principal rivers in the basin is regulated by the Lake Marion and Moultrie impoundments.

In 1940 the population of the basin was estimated to be 192,666. The preliminary 1950 census indicates the population is 231,815.

ECONOMIC DEVELOPMENT

There are two urban communities in the basin having a combined population of 72,558. The largest is Charleston, South Carolina which has a population of 68,243. Population density is rather low, towns being few and small in size except for Charleston. Rural population is less than the average of South Carolina due to extensive areas of marshland,

Agricultural activities in the basin are considerably hampered by the large areas of swamps and wet lowlands. Some progress has been made in converting lowlands to pastures. Cotton and corn are grown wherever possible in the upland areas, and there are extensive truck-farms along the coastal region.

Nearly all significant industry is located in or near the City of Charleston. A wide variety of plants are located there consisting of pulp and paper manufacturing, textiles, food processing, wood products, chemical and fertilizer plants. Oysters, shrimp and fish are plentiful in the tidal waters resulting in some commercial operations along the coast.

USE OF WATER RESOURCES

There are nine public water supplies in the basin serving 82,450 people. Charleston is the only one that uses surface water.

Recreational pursuits are predominantly connected with the presence of large bodies of water. Fishing and wild fowl hunting are practiced on Lakes Marion and Moultrie as well as the coastal brackish and salt waters. There are extensive commercial recreational developments of the beach areas near Charleston.

Hydro power and navigation developments are confined to the works at Lake Moultrie for electric power, and the provisions of navigation through Lake Marion and Lake Moultrie from the Cooper River.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in Tables A through I, inclusive.

There are ten municipal sources of pollution in the basin having a combined population of more than 105,750. This includes those sources for which no population served figures are available. This pollution is reduced by treatment to a population equivalent of 103,230.

A pollution survey of all industrial establishments in the basin has not been completed. One industry, producing paper and allied products, discharges organic waste of unknown strength.

One municipality has a primary treatment plant serving 3,200 people. Another has secondary treatment serving a population of 600. Both municipal treatment plants are adequate with relation to capacity and operation. Eight municipal type sources of pollution, having a connected population of 101,950, discharge sewage without treatment. No known industrial waste treatment is provided in the basin.

No municipal or industrial treatment plants were constructed during the period 1946 through 1949.

Requirements to abate pollution in the basin are thirteen new municipal treatment plants to serve a population of 101,950 and one known industrial waste treatment plant. The project requirement at one municipality is undetermined.

No formal action to abate pollution has been taken with thirteen municipal or one industrial polluters. Plans are being prepared for two municipal treatment plants and the project status of one is undetermined.

TABLE A (14)

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to Water course (In Terms of Equivalent number of People)
Having data on pollution load discharged to watercourse	7	105,750	103,230
Having population data available (Data on pollution load to watercourse incomplete or nor available)	0	-	Not Applicable
TOTAL	** 10	105,750	XXX XXX

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes Ft. Moultrie (Sullivans Island) and two U.S. Military Installations for which no population served figures are available.

TABLE B (14)

SOURCES OF POLLUTION

INDUSTRIAL

Industries*	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	0	-
Producing Organic Wastes	1	Undetermined
Producing Inorganic Wastes	0	Not Applicable
Producing Wastes of Undetermined Type	0	Undetermined
TOTAL	1	xxx xxx

* A survey of all industrial establishments in the basin has not been completed.

TABLE C (14)

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number Municipalities*	Plants	Population Served
Primary	1	1	3,200
Secondary	1	1	600
No Treatment	**8		101,950

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes Ft. Moultrie (Sullivans Island) and two U.S. Military Installations for which no population figures are available.

TABLE $D_{(14)}$

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

Type Industry	Number of Plants	Number of Industrial Plants Having: Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Paper & Allied Products	1	0	1	0

* Industries having separate outlets and discharging wastes directly to watercourse. Survey of industrial establishments in the basin has not been completed.

TABLE E(14)

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to:					
		Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	2	2	0	0	2	0	0
Industrial	0	-	-	-	-	-	-

TABLE F(14)

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv. No. People)
1946	0	-	0	-
1947	0	-	0	-
1948	0	-	0	-
1949	0	-	0	-

TABLE G(14)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number	Population Served by Facilities	Number
New Plant	* 13	101,950	1
Enlargement or Additions to Existing Plant	0	-	0
Replace Existing Plant	0	-	0
No Project Required	2	3,800	0
Undetermined	1	Not known	0

* Four new plants required by each of two municipalities and two municipalities will be served by one new plant.

TABLE H (14)

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number	
	Municipal	Industrial
No Formal Action	13	1
Abatement Ordered	0	0
Plans under Preparation	2	0
Final Plans Approved	0	0
Construction Awaiting Financing	0	0
Under Construction	0	0
Status Undetermined	1	0

TABLE I (14)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1, 1950

Name	Population Served	Project Requirements	Remarks
Avondale Housing Development, S.C.	1,500	New Plant	
Charleston #1, S.C.	43,100	New Plant	
Charleston #2, S.C.	13,500	New Plant	
Charleston #3, S.C.	10,000	New Plant	
Charleston #4, S.C.	4,000	New Plant	
Ft. Moultrie, Sullivans Island, S.C.	Not Known	One New Plant	Plans under Preparation with Mt. Pleasant
Mount Pleasant #1	1,800		Plans under Preparation with Ft.Moultrie
Mount Pleasant #2	600	New Plant	
Monck Corner	1,500	New Plant	
North Charleston #1	8,850	New Plant	
North Charleston #2	14,000	New Plant	
North Charleston #3	1,100	New Plant	
North Charleston #4	2,000	New Plant	
U.S. Army Reservation	Not Known	Undetermined	
U.S. Navy Reservation	Not Known	New Plant	
Paper & Allied	Not Known	One New Plant	

SUB-BASIN 15

EDISTO_COMBAHEE RIVER BASIN

GENERAL DESCRIPTION

The Edisto-Combahee River Basin consists of an irregular area in the south-central portion of South Carolina, bounded on the north by the Congaree Basin, on the east by the Santee Basin, on the southeast by the Atlantic Ocean and on the southwest by the Savannah River Basin. The area comprising about 5,759 square miles is drained by several rivers flowing roughly parallel into the Atlantic Ocean. The principal streams are the Edisto and Combahee Rivers. Of these, only the Edisto River is of considerable length, having two parallel branches which originate near the center of the State.

The land in the basin is predominantly level with extensive areas of salt-marsh along the coast and river courses are in general straight and regualr, except in the coastal area.

Climate is uniformly warm over the area, and the mean annual temperature is about sixty-five degrees. Average annual rainfall varies from forty-four inches in the north part to forty-nine inches in the south coastal area. Available records on the U.S. Geological Survey gauge at Givhans, South Carolina, indicate the minimum flow of the Edisto River above the point of Charleston water supply diversion to be approximately 500 cubic feet per second. The drainage area at this point is 2730 square miles.

The 1940 population of the basin was 225,250. Preliminary 1950 census reports indicate a population of 245,243.

ECONOMIC DEVELOPMENT

There are six urban communities and a part of a seventh in the basin. Urban population in 1940 was nearly ten percent of the total and the preliminary 1950 census indicates an increase to approximately fifteen percent. The largest municipality in the basin is Orangeburg having an estimated 1950 population of 15,311.

The area is predominantly agricultural and a large variety of crops are produced, including intensified truck farming of early vegetables, melons and small fruits. Industry is very light, the principal operations being connected with the extensive forests in the lower portion and the shrimp and oyster beds along the coast. These beds are well developed and are an important source of income in the coastal area.

USE OF WATER RESOURCES

There are twenty-eight public water supplies in the basin serving a combined population of 52,665. Of these, three are surface supplies serving 21,600 or forty-one percent of the total public supply.

Fish and wildlife normal to this region are plentiful and extensively used for recreation. The coastal area is particularly favorable to the production of fish as evidenced by the great number of people who enjoy this sport and also by the activities of commercial fisherman along the coast.

Water power development is very small and navigation is limited to the waters of the Intracoastal Waterway.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in Tables A to I, inclusive.

There are sixteen municipal sources of pollution in the basin with a combined sewered population of 37,315, and one source consisting of a U.S. Military Installation for which no population figure is available. Treatment at fourteen municipal sources reduces the pollution load to an equivalent population of 21,505.

Two industries discharge wastes directly to watercourses; one producing organic wastes of an undetermined amount, and wastes from another are undetermined as to amount and type.

Ten municipalities have primary treatment plants serving a connected population of 11,525. There are six secondary treatment plants in the basin serving more than 21,390 people as the population at one military installation with secondary treatment is unknown. No treatment is provided at two municipalities having a sewered population of 4,400. Treatment is provided at one industry producing wastes of an undetermined type and amount.

Nine of the sixteen municipal treatment plants are adequate with respect to capacity and fourteen are satisfactorily operated. The industrial waste treatment plant is reported to be adequate with relation to design and operation.

Two municipal sewage treatment plants were constructed in 1949 to serve a combined population of 5,000. Requirements for abatement of pollution in the basin include six new municipal treatment plants to serve 9,075 people and one new industrial waste treatment plant.

Plans are under preparation for construction of two of the municipal treatment plants and the status of the industrial plant is undetermined. No formal action has been taken with the remaining four municipalities requiring treatment plants.

TABLE A (15).

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to Watercourse (In Terms of Equivalent number of People)
Having data on pollution load discharged to watercourse	16	37,315	21,505
Having population data available (Data on pollution load to watercourse incomplete or not available	0	-	Not Applicable
TOTAL	**17	37,315	XXX XXX

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes one U.S. Military Installation, Paris Island Marine Base, for which no population served or pollution discharged figures are available.

TABLE B (15)

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	0	-
Producing Organic Wastes	1	Undetermined
Producing Inorganic Wastes	0	Not Applicable
Producing Wastes of Undetermined Type	1	Undetermined
TOTAL	2	xxx xxx

TABLE C (15)

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number Municipalities*	Plants	Population Served
Primary	10	10	11,525
Secondary	** 6	6	21,390
No Treatment	2	XXXX	4,400

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

** Includes one U.S. Military Installation for which no population served figure is available and one municipality also included under primary treatment.

TABLE D(15)

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

		Number of Industrial Plants Having:		
Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Chemical & Allied Products	1	0	1	0
Miscellaneous	1	1	0	0

* Industries having separate outlets and discharging wastes directly to watercourse.

TABLE E (15)

ADEQUACY OF EXISTING TREATMENT FACILITIES

Existing Treatment Facilities	Number	Adequacy with Relation to:					
		Capacity			Operation		
		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	16	9	7	0	14	2	0
Industrial	1	1	0	0	1	0	0

TABLE F (15)

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv.No.People)
1946	0	-	0	-
1947	0	-	0	-
1948	0	-	0	-
1949	2	5,000	0	-

TABLE G (15)

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number	Population Served by Facilities	Number
New Plant	6	9,075	1
Enlargement or Additions to Existing Plant	0	-	0
Replace Existing Plant	0	-	0
No Project Required	* 12	28,240	1
Undetermined	0	-	0

* Includes U. S. Military Installation for which no population served figure is available and two treatment plants at one municipality.

TABLE H (15)

STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number Municipal	Industrial
No Formal Action	4	0
Abatement Ordered	0	0
Plans under Preparation	2	0
Final Plans Approved	0	0
Construction Awaiting Financing	0	0
Under Construction	0	0
Status Undetermined	0	1

TABLE I (15)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

July 1, 1950

Name	Population Served	Project Requirements	Remarks
Allendale, S.C.	1,500	New Plant	
Batesburg, S.C.	1,400	New Plant	
Beaufort, S.C.	3,200	New Plant	Plans under Preparation
Denmark, S.C.	1,700	New Plant	
Hampton, S.C.	675	New Plant	
Johnston, S.C.	600	New Plant	Plans under Preparation
Chemical and Allied Products	Not Known	One New Plant	

SUB-BASIN 16

SAVANNAH RIVER BASIN

GENERAL DESCRIPTION

The Savannah River Basin is a relatively long area and is roughly triangular in shape with one point of the triangle at the Atlantic Ocean near Savannah, Georgia. The basin is bounded on the northeast by the Congaree and Edisto-Combahee River Basins, on the southwest by the Ogeechee and Oconee River Basins, on the northwest and north by the Chattahoochee and Tennessee River Basins. This total area, including small coastal streams near the mouth of the main river, is 10,869 square miles, of which about 4,678 square miles lie in South Carolina, 6,015 square miles in Georgia and a small portion in the mountains of North Carolina.

The headwaters of the Savannah River are on the slope of the Blue Ridge mountains,north of the boundaries between North Carolina, Georgia, and South Carolina. The river in general flows in a southeasterly course and with certain tributaries forms the boundary between Georgia and South Carolina to the Atlantic Ocean. The principal tributaries of the Savannah River are the Tugaloo, Seneca, Keowee, Broad and Little Rivers and Horse Creek.

The basin is divided into three physiographic areas; the Mountain, Piedmont, and Coastal Plain areas. Elevations in the mountain section of the basin vary from 1,500 feet on the Tallulah River to 5,030 feet at the highest peak in North Carolina. The Piedmont area is essentially an upland of fairly strong relief and has some deep valleys and no lowlands. Exclusive of river valleys its altitude varies from about 500 feet at the fall line to about 1,800 feet. In the Coastal Plain the river beds lack falls and rapids. From the ocean to the fall line the coastal plain consists of terraces and considerably swampy areas lie adjacent to the river. The slope of the river and its tributaries vary from 0.6 feet per mile below Augusta to 122 feet per mile in the mountains. Many of the tributaries in the upper part of the basin are typical mountain streams flowing in places through rock gorges.

The climate of the upper portion of the basin is relatively temperate. Average temperatures are higher in the downstream section due to the influence of decreasing altitude. Mean annual temperature at Toccoa, Georgia, is about sixty-one degrees and at Savannah, sixty-five degrees.

Rainfall is very evenly distributed throughout the year; such floods as occur are seldom serious. Mean annual rainfall in the upper part of the basin is about fifty-eight inches and varies from forty-five inches in the upper portion of the coastal plain near Augusta to forty-seven inches at Savannah. The mean annual precipitation is 84.90 inches at

Highlands, North Carolina. The basin lies in the path of hurricanes that usually occur in the late summer and fall with heaviest rainfall occuring during this period. Discharges in several of the tributaries and the main river are regulated to some extent by power developments. A twenty-one year record of the U.S. Geological Survey gauge at Augusta, Georgia, shows the average discharge to be 10,740 cubic feet per second and the minimum flow recorded was 648 cubic feet per second.

In 1940, the estimated population of the basin was 655,763. The preliminary 1950 census report indicates a population of 712,217.

ECONOMIC DEVELOPMENT

There are nineteen urban communities and parts of two others in the basin. None of these are in North Carolina, ten are in Georgia, and nine and the part of two are in South Carolina. More than half of the total population in the basin is in Georgia, of which about fifty-one percent (225,935) is urban.* Twenty-two percent (58,807) of the South Carolina population is classed as urban and the overall urban population in the basin is forty percent of the total.

Agricultural operations are carried on throughout the basin. The soil is adapted to the growing of fruit, truck and grain crops, cotton and hay, and to the production of poultry, eggs, and livestock. The largest farms are found in the downstream areas as the upstream farmers are considerably hampered by erosion and hilly terrain. Industrial development in the South Carolina portion of the basin is mostly textile. Nearly every town in this part of the area has a textile plant but production is generally confined to spinning and weaving with few plants engaged in finishing, printing or dyeing.

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* The combined population of Augusta (71,507) and Savannah (119,689) constitute eighty-five percent of the Georgia urban population in the basin.

Numerous industries exist in the Georgia part of the basin including kaolin and asbestos mines, textiles and textile material production, paper and paper products, fertilizers, timber and timber products and naval stores.

USE OF WATER RESOURCES

There are sixty-eight public water supplies in the basin, of which twenty-three are derived from surface sources. These surface supplies serve a population of 214,150, and ground water supplies serve 136,663 people.

The entire basin shows considerable usage of streams for general recreation, hunting and fishing, but mostly by local people. Fishing however, is confined to the upper half of the main stream and to its tributaries because of excessive turbidity. Many of the mountain streams are stocked with trout.

Hydroelectric power is at present just beginning to be developed, with a dam and plant under constuction at Clark Hill and another being considered at Hartwell. The Clark Hill Reservoir is primarily for power development, and is the first unit in an over-all plan for power, flood control and navigation improvement on the Savannah River. Auxiliary uses of reservoirs will include recreation and wild-life conservation. It is proposed to develop recreational and park areas at several sites in South Carolina and Georgia.

Navigation is generally confined to the downstream portion of the Savannah River, but is subject to considerable future development.

POLLUTION AND POLLUTION CONTROL

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in Tables A through I, inclusive.

There are fifty-five municipal sources of pollution in the basin having a sewered population of 288,430. Of these, thirty-four with a sewered population of 98,530 discharge waste with a population equivalent of 88,430 and two with a population of 5,700 discharging unknown amounts are in South Carolina. Nineteen with a combined population of 184,200 are in Georgia.

One hundred and twenty-four industries, which may or may not discharge wastes directly to a watercourse and are of a type normally considered to have wastes with pollution characteristics, are in the basin. One industry in South Carolina producing organic wastes discharges pollution having a population equivalent of 9,855.

There are thirty-one municipalities having a total of forty-three primary treatment plants serving a population of 81,050. Six municipalities with secondary treatment plants serve a population of 17,400. Sewage from 189,980 at eighteen municipalities receives no treatment. No industrial waste treatment plants are reported to exist in the Savannah River Basin.

Of the thirty-seven municipal sewage treatment plants in South Carolina, ten are reported adequate with relation to capacity and fifteen are satisfactory as to operation. The adequacy with relation to capacity and operation of the twelve treatment plants in Georgia is unreported.

During the period 1946 through 1949 there were eight municipal treatment plants constructed to serve a combined population of 8,850. No industrial waste treatment plants were reported constructed during this same period.

Requirements to abate pollution in the basin are twenty-eight new municipal plants to serve a total population of 33,080 and one new industrial waste treatment plant and enlargement or addition to eight municipal plants serving a population of 48,550. No project is required at eleven South Carolina municipalities having a combined population of 20,600. The requirements to abate pollution at nineteen Georgia municipalities having a combined population of 184,200 remains undetermined. Requirements for 123 industrial establishments is also undetermined.

In South Carolina four new treatment plants are under construction, plans for ten additional treatment plants are being prepared and no formal action has been taken with twenty-two municipalities and one industry. The status of treatment works projects to abate pollution in Georgia has not been reported.

TABLE A(16)

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities)	Population Served by Sewerage System	Amount of Pollution Discharged to Watercourse (In Terms of Equivalent number of People)
Having data on pollution load discharged to watercourse	34	98,530	88,430
Having population data available (Data on pollution load to watercourse incomplete or not available)	21	189,900	Not Applicable
TOTAL	55	288,430	XXX XXX

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

TABLE B(16)

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equiv. No. of People)
Producing Organic Wastes	1	9,855
Producing Organic Wastes	0	Undetermined
Producing Inorganic Wastes	0	Not Applicable
Producing Wastes of Undetermined Type	*123	Undetermined
TOTAL	124	xxx xxx

* Includes industries (only those types normally considered to discharge waste with polluting characteristics) located in the Georgia portion of the sub-basin, which may or may not have separate outlets. Information obtained from "Manufactures of Georgia" prepared by the Georgia Agricultural and Industrial Development Board and supplemented by information from the Georgia State Department of Commerce.

TABLE C (16)

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number Municipalities*	Plants	Population Served
Primary	31	43	81,050
Secondary	6	6	17,400
No Treatment	18	XXX	189,980

* Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

TABLE D (16)

EXISTING TREATMENT FACILITIES

INDUSTRIAL *

		Number of Industrial Plants Having:		
Type Industry	Number of Plants	Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Food and Kindred Products	43	0	0	43
Textile Mill Products	6	0	** 2	4
Lumber and Wood Products	1	0	0	1
Paper and Allied Products	1	0	0	1
Chemical and Allied Products	62	0	0	62
Product of Petroleum and Coal	2	0	0	2
Fabricated Metal Products	5	0	0	5
Miscellaneous	4	0	0	4

* Industries having separate outlets and discharging wastes directly to watercourse.

** Information on the two industries in South Carolina furnished by the South Carolina Water Pollution Control Authority.

TABLE E$_{(16)}$

ADEQUACY OF EXISTING TREATMENT FACILITIES*

Existing		Adequacy with Relation to:					
Treatment	Number		Capacity			Operation	
Facilities		Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Municipal	49	10	27	12	15	22	12
Industrial	0	-	-	-	-	-	-

* No report on Georgia portion of sub-basin.

TABLE F(16)

PROGRESS IN POLLUTION ABATEMENT

	Municipal		Industrial	
Year	Plants Completed	Design Population	Plants Completed	Amount of Wastes Treated (In Terms of Equiv. No. People)
1946	1	800	0	-
1947	1	4,000	0	-
1948	0	-	0	-
1949	6	4,050	0	-

TABLE $G_{(16)}$

REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PLANTS

Requirements	Municipal		Industrial
	Number	Population Served by Facilities	Number
New Plant	* 28	33,080	1
Enlargement or Additions to Existing Plant	8	48,550	0
Replace Existing Plant	0	-	0
No Project Required	11	20,600	0
Undetermined	21	186,200	123

* One municipality which has no treatment will require two treatment plants.

TABLE H(16)
STATUS OF TREATMENT WORKS PROJECT TO ABATE POLLUTION

July 1, 1950

Status of Project	Number	
	Municipal	Industrial
No Formal Action	22	1
Abatement Ordered	0	0
Plans under Preparation	10	0
Final Plans Approved	0	0
Construction Awaiting Financing	0	0
Under Construction	4	0
Status Undetermined *	21	123

* No report for Georgia portion of sub-basin.

TABLE I(16)

PROJECT LIST - MUNICIPALITIES AND INDUSTRIES REQUIRING IMPROVEMENTS FOR ABATEMENT OF POLLUTION*

July 1, 1950

Name	Population Served	Project Requirements	Remarks
Abbeville, S.C.	4,250	New Plant	
Alice Mill Village	1,000	New Plant	
Anderson, S.C.	41,000	Additions to two Plants	Two Existing Primary Treatment Plants
Arial Mill Village	300	New Plant	
Bath Mill Village	680	New Plant	
Belton, S.C.	1,800	New Plant, Addition to Existing Plant	Both projects under construction
Clearwater and Mill Villages	1,200	Two New Plants	
Clemson, S.C.	5,500	New Plant	
Due West, S.C.	1,300	Two New Plants	
Easley, S.C.	1,250	New Plant	
Edgefield, S.C.	1,800	Additional Treatment	
Gluck, S.C.	250	Additional Treatment	
Honea Path, S.C.	1,200	Addition to Plant	Enlargement of Sludge Beds
Iva, S.C.	650	New Plant	Under Construction
Liberty, S.C.	4,300	Two New Plants	Engineer Employed
McCormick, S.C.	1,600	Additions to Plant	
Newry, S.C.	1,200	New Plant	

2-I-16

Name	Population Served	Project Requirements	Remarks
La France, S.C. (Mill Village)	600	New Plant	Engineer Employed
Pendelton, S.C.	300	New Plant	
Pickens, S.C.	1,250	Three New Plants	One under construct Two being planned
Pickens Mill Village	1,000	One New Plant	May be included with municipality
Seneca, S.C.	3,300	Three New Plants	
Seneca Mill Village	1,500	Additions to Plant	
Walhalla, S.C.	2,600	Two New Plants	Plans under Preparation
Westminister, S.C.	1,800	Two New Plants	
Two Textile Mill Products	9,855	One New Plant	
	Not Known	One Undetermined	

* No report for Georgia portion of sub-basin.